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THE IRON AGE

JUN 6 - 1946

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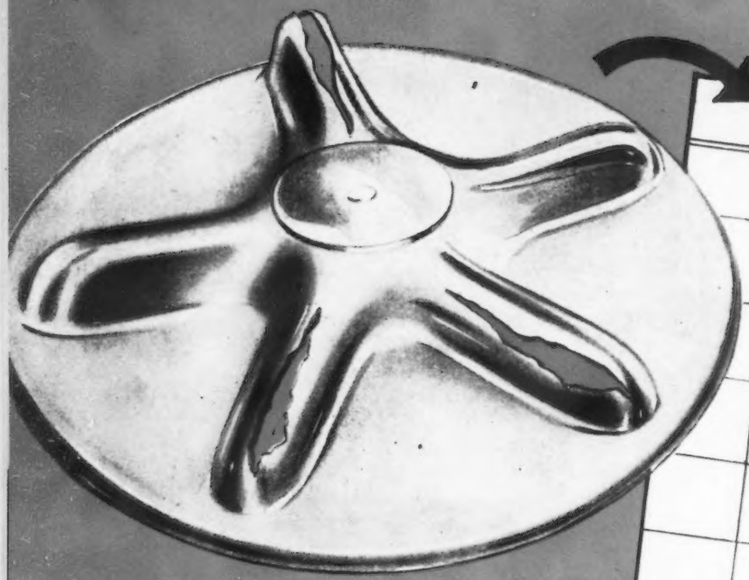
Trouble always shows up TWICE



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Interested in Export?

IF you are interested in developing foreign trade and in building an export volume there are two ways you could go about learning the "how" of it. One is the long way and the other the short way. Both ways are alike in that they consist of utilizing the knowledge and experience of the outstanding authorities in international trade.

The long way would consist of packing your grip for a trip to New York and Washington, after, of course, making engagements with the executives of the ten organizations in those cities who collectively can be said to know all that is known, up to the present, on this subject.

In New York, you would call on Wallace Clark, of the Association of Consulting Management Engineers; on Wilbert Ward, of the Bankers Association for Foreign Trade and vice-president of the National City Bank; on John Abbink, president of Business Publishers' International Corporation and chairman, National Foreign Trade Council; on Robert Patchen, of the U. S. Chamber of Commerce and vice-president of W. R. Grace and Co. Also on Philip J. Gray, manager, the Foreign Credit Interchange Bureau; on Herbert H. Schell, of the National Association of Manufacturers and president of Sidney Blumenthal Co.; on Harry S. Radcliffe, executive-secretary of the National Council of American Importers; on Eugene P. Thomas, president of the National Foreign Trade Council, and on John P. Gregg, executive director, United States Associates, International Chamber of Commerce. Also, in Washington, you would pay a visit to E. E. Schnellbacher, chief of Commercial and Economic Information, U. S. Department of Commerce.

After you had spent several hours with each of these authorities and had obtained the benefit of their advice and experience, you could return home with the assurance, provided you had asked them the right questions, that your approach to the problem of exports was fundamentally sound.

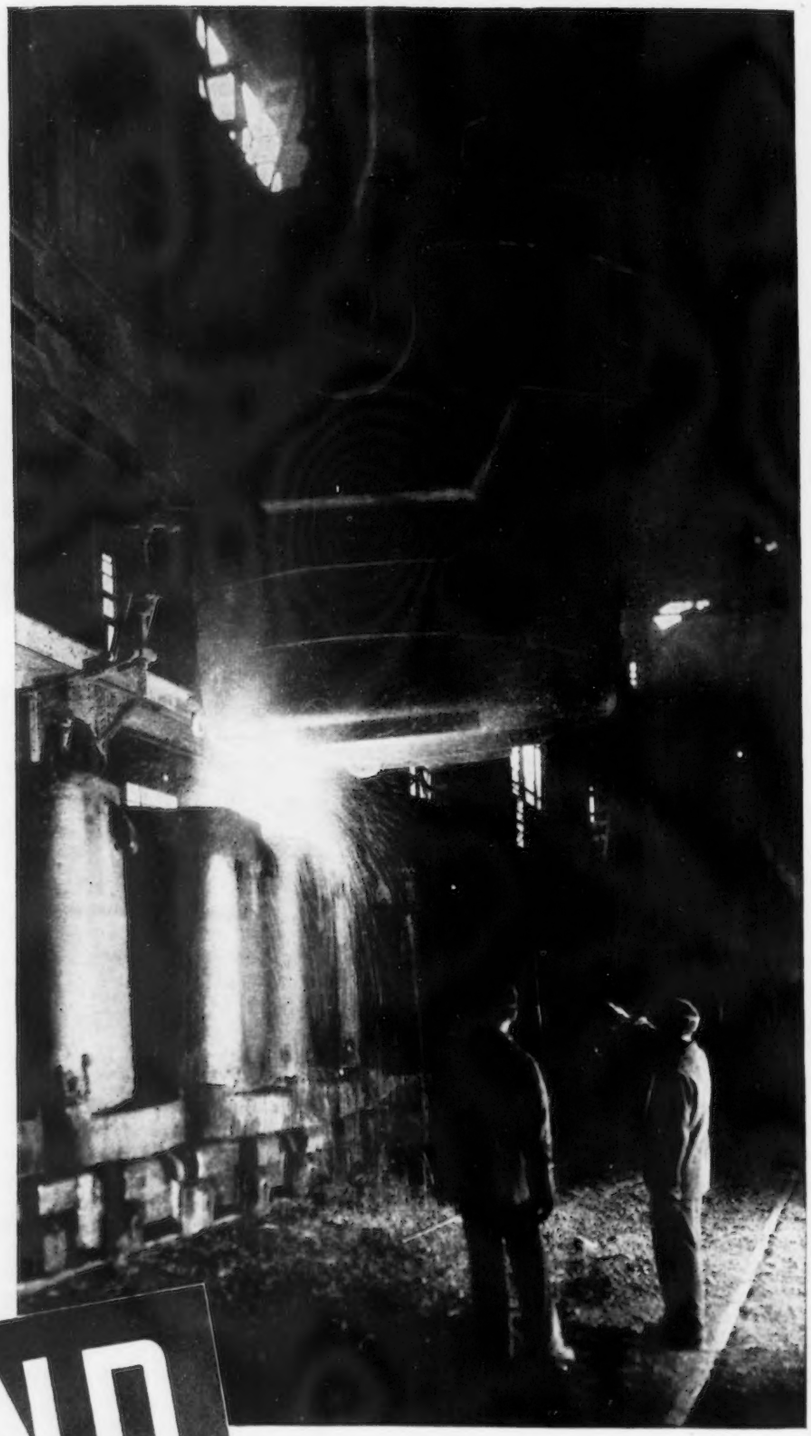
Unfortunately, this long way is not a practical one. For one thing, you, and by that I mean the thousands of manufacturers inexperienced but interested in foreign trade, would find it difficult to make engagements with these busy men.

So I recommend that you take the short way, that has been prepared for you by the Committee for Economic Development. The CED reversed the ancient formula and has brought the whole range of mountains to Mohammed, which is you.

Realizing the need for the fullest possible information for American manufacturers regarding the development of markets abroad, the Committee for Economic Development obtained the cooperation of all of the experts mentioned above in producing "A Handbook of International Trade." This one hundred page handbook is by all odds the most helpful and authoritative treatise on this subject yet issued or likely to be.

Primarily, this handbook is divided into two parts plus an appendix. Part One deals with export for the manufacturer. Part Two deals with import for the manufacturer, wholesale distributor and retailer. Each of these two parts is treated in a succession of steps expressed with clear thought and in understandable English.

Anyone considering international trade, or even those who are already in it, should obtain a copy of this handbook. It is yours for fifty cents, which represents just about half the mechanical cost of printing and mailing. Conservatively, considering its authorship and sponsorship, it is worth anywhere from fifty to fifty thousand dollars, considering the mistakes you could make if you did not have it. It is distributed by the Committee for Economic Development, 285 Madison Avenue, New York 17, N. Y., and by the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.



Pouring ingot molds at Inland's Indiana Harbor Plant.

New Steels

Our modern, changing world is placing new demands on steel—with particular emphasis on the high-strength, low-weight ratio; durability, uniformity and appearance. As a result, better steels, more versatile and adaptable than ever before, are being developed—some far in advance of the newer uses and improvements they eventually bring about.

Typical result of this intensive research program at Inland is "Hi-Steel" . . . solution to numerous high-strength, low-weight ratio requirements in steel construction problems. Daily, Inland metallurgists are engaged in solving current and long-range material problems of Industry. From this experience and from the continuing research program, come the greater achievements of tomorrow.

We will be glad to work with you on any problems concerning the selection or fabrication of steel.

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Principal Products: BARS • STRUCTURALS PLATES • SHEETS • STRIP • TIN PLATE PILING • REINFORCING BARS • RAILS TRACK ACCESSORIES.

► While Henry Kaiser has been noncommittal about his interests in the Midwest, it is known that his company at Fontana has applied for a special freight rate on steel ingots from Fontana, Calif., to Detroit.

It can be assumed that with the capacity at Great Lakes for reducing ingots Henry Kaiser has made an agreement with that company to process his ingots which last week were "on the way."

► Unlike the steel strike which left companies with sufficient stocks of raw materials, the aftermath of the coal strike is an industry with either low or no coal stocks. It will take one week to 10 days before sufficient coal reaches steel companies.

► Because steel companies will concentrate their output on the most profitable products, output of consumer goods will be retarded several months. While the major items of consumer production requirements will be available, programs will be held back because of shortages of minor items which many companies have eliminated from their production schedules.

► For want of a nail, the nation's construction program will be seriously impeded. Several years ago many companies eliminated nail machines because of the low return. Today nail capacity is far below actual demand, and the shortage may extend well into 1947.

► Finished parts costing approximately $465 are currently bought for each Ford car coming off the assembly line, a company tabulation reveals. These include chassis stampings, shock absorbers, bearings, and bushings, and side body and door assemblies.

► Price increases granted farm equipment makers have only partially lifted the industry's clouds. With the tillage and harvest season just around the corner, production lags badly, major strikes still have stopped two big farm tool makers cold.

► Pig iron and cast iron soil pipe will share in the $400 million subsidy as a means of increasing supplies for the veteran housing goal of 2,700,000 homes under construction by the end of next year.

► Demonstrated for the first time by the Navy last week was the fully automatic rocket launcher, the Mark 102. It is director-controlled and power-driven, like a gun mount, and can maintain a continuous stream of accurately aimed 5-in. rockets at a rate of 40 to 50 rockets per min.

► The atomic scientists expect little additional information from Operations Crossroads. However, they believe that the two tests to be conducted next year, in particular the deep sea bombing, to bring some surprising, if not startling, results.

► To offset the losses of former markets, Swedish steel mills have formed a joint sales organization to penetrate new and undeveloped markets in China and other Asiatic areas, Australia and possibly South America.

► British officials now are broaching two possible plans for the future of the Ruhr. One would call for a measure of political control for the area by a seven-power board, the other would provide for only administrative and industrial control. Britain is said to be ready to accept either plan, but France is more likely to favor the first, including political control.

► Americans in London are estimating that machine tool orders are going to Britain rather than the United States in the ratio of 4:1. Slow deliveries and out-of-date methods of payments are thought to be two of the outstanding reasons for the hesitancy of Continental buyers to place orders with American firms.

British machine tool builders say that about 60 pct of their current production is being delivered outside the United Kingdom.

► Switzerland has sent miners to Belgium to assist in coal production in that country and indirectly to facilitate coal exports to Switzerland.

► British tinplate workers will now work on 6-hr shifts as a result of negotiations by special committees of the Joint Industrial Council of the British tinplate trade. The negotiations also resulted in a guaranteed work week.

► Slow expansion of automobile output in Britain is contributing to the existence of a substantial racket in the resale of slightly used new cars. A few miles suffices to permit their sale as used cars, on which there is no ceiling. Prices are double the regular figure.

On the government's percentage basis, production for the home British market expanded by 57 pct between January and March of this year.

► West Coast scrap consumers, now that scrap prices there have hit OPA ceilings, are negotiating to import scrap from Belgium and the Hawaiian Islands.

They are seeking not only material at lower prices but the assurance of adequate stockpiles to prevent curtailed production.

Practical Tool Room Heat Treatment

o o o

By F. J. McMULKIN

Dept. of Engineering and Metallurgy, Ontario Research Foundation, Toronto, Canada

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A summary covering tool steel heat treatment techniques, intended primarily for the practical heat treater, is presented in this four-part article. In this, the first part, the author reviews the various classifications of tool steels and introduces the principles of heat treatment, with particular emphasis on precautions to be observed during the heating cycle.

MUCH of the success in the manufacture of a steel tool is dependent upon the heat treatment that it receives. Assuming that good quality steel of the correct grade or type has been chosen and that a good tool design, coupled with good toolmaking has been employed, it lies with the final operation, the heat treatment, to either make or break the tool.

An intricate blanking die which must possess high hardness and high resistance to wear is certainly not a useful tool unless the required hardness and wear resistance are developed in the steel by correct heat treatment. But on the other hand, it is quite possible to find this same blanking die, while possessing these potential required properties, to be entirely useless because it has cracked during the heat-treating operation. If the choice of steel is correct and the tool design sound, it is obvious that the use of an improper heat-treatment technique is responsible for loss through breakage.

Many heat treaters must be guided by the data furnished in the tool steel manufacturer's catalog for the treatment to be given a certain type of steel.

Theoretical aspects of heat treatment are covered in detail in "Heat Treatment of High Speed Steel," THE IRON AGE, Feb. 28, Mar. 7, 14, 21 and 28, 1946.

More often than not this data simply provides the recommended hardening temperature range, the quenching medium or media used and the draw temperature range. Obviously there are many gaps in this type of heat treatment instruction, since the manufacturer realizes that many different types of tools for different applications will be made from any one of his steels and, therefore, no one heat-treatment instruction which the manufacturer could lay down would be equally satisfactory in every case.

Thus, it is the purpose in this article to fill in the gaps and describe in a practical way, safe heat-treatment practices and the reasons lying behind the recommendation of these practices. There are many precautions in heat treating which the heat treater is often advised to take; many of these offered in good faith are nevertheless erroneous. It is endeavored here to explain in a practical manner the underlying reasons for observing many of the well-known precautions.

A large percentage of all specialized tools requiring heat treatment are treated in small heat-treatment shops which are under the supervision of one man, the heat treater. The majority of these men are skilled craftsmen in their line, though sometimes lacking the opportunity to obtain a basic metallurgical understanding of the mechanics involved in the heat treating of steel. It is for the information and guidance of such men that these notes on practical tool room heat treatment are primarily intended.

Many attempts have been made to classify tool steels in such a manner that it would be easy for any metallurgist or heat treater to describe a given tool steel accurately according to a common nomenclature. For a long time, tool steels have been classified in different grades, as water-hardening, oil-hardening, air-hardening and high-speed. Unfortunately there is considerable overlapping of classification when this type of grading is used. There have been attempts also to classify tool steels according to their application, such as hot-work steels, finishing tool steels, chisel steels, and so on. Tool steels have also been classified according to their general physical properties which are commonly expressed by the terms red hard, red tough, red wear, and so on. These are easily understood terms; however, it is possible to have a wide variety of different chemical compositions which may give a steel, say, in the red hard classification. An example of this is afforded when a comparison is made between the 18-4-2 cobalt high-speed and the relatively new tungsten-molybdenum high-speed steel.

J. P. Gill has afforded a classification which divides the common tool steels into 12 major types. This classification is reproduced in table I, and it will be noted that the classification is based primarily on the predominant alloy contained in the steel together with the major application for which this steel is intended and for which it is generally used.

Gill has also rated the different types of steel listed in table I with respect to their general physical properties. This physical character classification is shown in table II. By the use of these two tables it is possible to select the correct grade or type of tool steel for the tool applications which are normally encountered.

In table III are listed the different chemical compositions which on the whole are representative of the steels marketed in the different types listed in

TABLE I

Classification of Tool Steels According to Chemistry

Type No.	Type	Carbon, Pct	Tungsten, Pct	Chromium, Pct	Vanadium, Pct
1	Carbon tool steel	Variable	.....	.....	.....
2	Chromium-vanadium (or low chromium)[1]	Variable	.....	0.30 to 0.90	.....
3	High carbon, low tungsten	1.00 to 1.30	1.00 to 2.00	0.50 to 1.50	0.15 to 0.30
4	Manganese oil hardening[2]	0.80 to 1.00	0.40 to 0.60	0.40 to 0.60	.....
5	Tungsten alloy chisel steel	0.45 to 0.60	1.00 to 2.00	1.00 to 1.50	0.15 to 0.30
6	Finishing tool steels	1.10 to 1.40	3.00 to 5.00	.....	.....
7	Chromium hot-work tool steels	0.35 to 1.00	.....	3.00 to 5.00	.....
8	Tungsten hot-work tool steels	0.25 to 0.45	8 to 15	2.50 to 3.50	.....
9	Chromium-tungsten hot-work tool steels	0.25 to 0.50	3.00 to 7.00	3.00 to 7.00	.....
10	Silicon-manganese[3]	0.50 to 0.65	.....	0.00 to 0.50	.....
11	High carbon, high chromium	1.50 to 2.25	.....	10 to 15	.....
12	High-speed steel[4]	0.50 to 0.85	14 to 20	3.00 to 4.50	0.75 to 2.25

[1] May or may not contain 0.15 to 0.25 pct vanadium.
[2] Manganese 1.00 to 1.75 pct; with manganese on the high side may not contain the other alloys.
[3] Silicon 1.5 to 2.5 pct, manganese 0.75 to 1.0 pct.
[4] May or may not contain from 2.5 to 12 pct cobalt. Up to 8 pct molybdenum may be substituted for all or part of the tungsten.

table I. A study of tables I and II will show that from type 1 to type 12, the depth of hardening tends to increase; or in other words, an increase in hardenability is obtained as shown by the ratings listed under the column "Depth of Case." It will also be noted that in following this same progression, the quenching media change from water to oil and from oil to air, which is in line with the greater hardenability encountered as we move from type 1 to type 12 in table I. The resistance to softening at high temperature also increases, this resistance being very low for the steels which are hardenable only with an oil or water quench, whereas those steels which are hardenable with an air quench show much greater softening resistance due to their high alloy content. The same trend is also noticed when resistance to wear is considered; however, in this case one must consider the type of material being worked by the tool in question. Toughness is not particularly high in the case of any of these steels and is primarily dependent on the hardness which is obtained in treating the steel. Deformation, or what is termed movement in hardening decreases, progressing from type 1 to type 12.

Table IV lists a concise summary of the heat treatment recommended for the different steel analyses shown in table III.

Transformation of steel on heating takes place only after the critical temperature has been passed, and it is not until transformation has been completed that it is possible to attain the desired results which are aimed for in normalizing, annealing, and hardening. It is therefore very important that the heating cycle specified in any of these treatments be carried out correctly.

Annealing and Normalizing—In most cases, tool steels as supplied by the steel manufacturer are in the annealed condition, and are thus conditioned for easy machining. Sometimes, however, it is neces-

TABLE II

Characteristics of Major Types of Tool Steels[1]

Type No.	Usual Working Hardness, Rockwell C	Resistance to Wear	Toughness	Movement on Hardening	Resistance to Softening at High Temp.	Quenching Medium	Depth of Case
1	[2]	Low	[2]	High	Low	Water	Shallow
2	[2]	Low	[2]	High	Low	Water	Medium
3	62 to 65	Medium	Medium	Low	Low	Oil	Medium
4	58 to 62	Low	Medium	Low	Low	Oil	Medium
5	50 to 55	Medium	High	Low	Medium	Oil	Medium
6	63 to 66	Medium	Low	High	Medium	Water	Deep
7	45 to 50	Medium	Medium	Low	Medium	Air or Oil	Deep
8	45 to 55	Medium	Medium	Low	High	Air or Oil	Deep
9	43 to 50	Medium	Medium	Low	High	Air or Oil	Deep
10	50 to 57	Medium	Medium	Medium	Medium	Water	Medium
11	58 to 66	High	Low	Low	High	Air or Oil	Deep
12	62 to 66	High	Low	Low	High	Air or Oil	Deep

[1] Comparison based on the steel hardened and tempered to the hardness which is most generally recommended and given in second column.
[2] Depends on carbon content.

TABLE III

Common Tool and Die Steels—Types and Analyses

TYPE 1: CARBON TOOL STEEL

	Carbon	Silicon	Manganese	Sulfur	Phos.	Vanadium
1	0.85	0.15-0.50	0.10-0.35	0.2	0.2	0.08-0.40 (opt.)
2	0.95	0.15-0.50	0.10-0.35	0.2	0.2	0.08-0.40 (opt.)
3	1.10 and Higher C	0.15-0.50	0.10-0.35	0.2	0.2	0.08-0.40 (opt.)

TYPE 2: LOW Cr AND Cr-V TOOL STEELS

	Carbon	Chromium		
4	0.60	0.50		
5	0.50	0.80	0.20 V	
6	0.60-1.30	0.50 Mo	1.50 Ni	0.60 Mn

TYPE 3: HIGH CARBON LOW TUNGSTEN STEELS

	Carbon	Manganese	Tungsten	Chromium	Vanadium
7	1.15-1.30	0.15-0.30	1.50-2.00	0.35-0.60	0.20 (opt.)

TYPE 4: MANGANESE OIL HARDENING

	Carbon	Manganese	Chromium	Tungsten	Vanadium
8	0.85-0.95	1.00-1.45	0.30-0.60	0.30-0.60W (opt.)	0.10-0.25 Va (opt.)
9	0.85-0.95	1.50-1.75	0.20-0.35 Mo	....	....

TYPE 5: TUNGSTEN ALLOY CHISEL STEELS

	Carbon	Tungsten	Chromium	Vanadium
10	0.40-0.65	1.50-2.50	1.00-2.00	0.10-0.30

TYPE 6: TUNGSTEN FINISHING STEEL

	Carbon	Tungsten	Chromium (opt.)
11	1.20-1.40	3.00-5.00	0.25-0.40

TYPE 7: HOT WORK CHROMIUM DIE STEELS

	Carbon	Chromium	
12	0.85-1.00	3.75-4.00	....
13	0.50-0.70	3.75-4.00	0.50 Mo

TYPE 8: TUNGSTEN DIE STEEL FOR HOT WORK

	Carbon	Tungsten	Chromium	Vanadium
14	0.25-0.35	8.00-12.00	2.50-3.50	0.30-0.60

TYPE 9: HOT WORK W-Cr DIE STEELS

	Carbon	Tungsten	Chromium	
15	0.35-0.50	6.50-7.50	6.50-7.50	0.80-1.50 Si 0.60 M. (opt.)
16	0.40-0.60	1.50-2.50	1.00-2.00	0.20 V. (opt.) 0.80 Mo

TYPE 10: Si-Mn PUNCH AND CHISEL STEELS

	Carbon	Manganese	Silicon
17	0.50-0.60 (0.50 max Cr,	0.70-0.90 0.25 max V	1.70-2.25 0.30 max Mo opt.)
18	0.50-0.60	0.35-0.60	0.75-1.25

TYPE 11: HIGH CARBON—HIGH CHROMIUM

	Carbon	Chromium	Vanadium	Molyb.	
19	2.00-2.45	12.00-14.00	0.25-1.00 (opt.)	....	1.00 (opt.) Si
20	1.40-1.60	12.00-13.00	....	0.80	0.50 max Co
21	1.40-1.60	12.00-13.00	0.75-1.00 (opt.)	0.80	0.50 max Co
22	1.40-1.60	12.00-13.00	0.75-1.00 (opt.)	0.80	3.50 Co

TYPE 12: HIGH-SPEED STEEL

	Carbon	Tungsten	Chromium	Vanadium	
23	0.70	18.00	4.00	1.00	....
24	0.75	14.00	4.00	2.00	....
25	0.80	18.00	4.00	2.00	0.50 (opt.) Mo
26	0.80	1.50	4.00	1.00	8.00-9.00 Mo
27	0.80	....	4.00	2.00	8.00-9.00 Mo
28	0.70	18.00	4.00	1.00	5.00 Co
29	0.80	18.00-20.00	4.00	2.00	8.00 Co
30	0.75	14.00	4.00	2.00	5.00-7.00 Co
31	0.80	20.00-21.00	4.00	1.25-2.00	12.00 Co
32	0.80	5.00-6.00	4.00	1.50	5.00-6.00 Mo

sary to soften the stock before machining, or it may be that a hardened tool must be softened to enable further machining.

In the first case, tool steel in the form of bar stock can be introduced into a hot furnace without any appreciable danger of cracking. In the case where it is desired to soften or, in other words, fully anneal a hardened tool, there is every danger that cracking will take place if it is introduced into a furnace which is at the annealing temperature. The safest practice which can be followed in the softening of a hardened tool is to pack the tool in some inert substance such as spent cast iron turnings and bring the whole pack up to temperature in the furnace. This will sufficiently slow down and equalize the heat flow into the steel so that cracking will be avoided.

In the full annealing of the different tool steels at the temperatures which have been recommended by tool steel manufacturers, it is generally sufficient to bring the steel up to the annealing temperature, followed by a soaking time at this temperature which will be sufficient to transform the steel completely and break up any structure which existed in its prior state.

In the case of plain high-carbon and water-hardening steels and the manganese and low-alloy nondeforming oil-hardening steels, it is generally considered good practice to use a soaking time of 1 hr per in. of maximum section.

With the high-carbon high-chromium type, certain of the air-hardening hot-die steels and the high-speed types, it is necessary to employ a somewat longer soaking time at temperature. This should be on the order of 1¼ to 1½ hr per in. of maximum section and never less than 1½ hr total time for even the smallest of tools made of high-speed steel.

In a full anneal it is necessary that cooling of the steel following the soaking treatment should be sufficiently slow in order that no hardening will take place. It will be necessary, of course, to cool in the furnace when the air-hardening type steels are being treated, and this is also considered good practice when the oil-hardening and water-hardening types are being treated. The cooling rate in the case of the last two types need not be as slow as in the case of the air-hardening steels, which in the higher alloy grades, such as high-speed, will not allow a cooling rate faster than 50°F per hr to be used if maximum machinability is to be obtained. Cooling high-speed steel from the annealing temperature (1550°F) calls for a slower cooling rate than that required for any other air-hardening steel—the maximum allowable cooling rate to attain a fully annealed structure is 50°F per hr. This need only be observed down to 900°F, after which temperature has been reached, cooling in air will not cause any hardening. Air-hardening steels with lesser alloy contents (lesser hardenability) may, of course, be cooled at somewhat faster rates but should not be removed from the furnace until at least 1000°F has been reached.

It is only possible to normalize the water-hardening and some of the low-alloy oil-hardening types of tool steels. Actually very few cases arise where a normalizing treatment is needed in treating tool steels and, when employed, it is generally for the purpose of obtaining an intermediate hardness like that aimed at in the treating of chisel shanks made

from oil-hardening steels (such as the tungsten alloy chisel type).

Heating for Hardening—There has been considerable debate as to the proper practice which should be followed in the heating, often called austenitizing, of tool steels prior to quenching. Some tool steel manufacturers claim that preheating is a prerequisite for good hardening in the treatment of all types of tool steels. It has been definitely proven, of course, that preheating is necessary if good results are to be obtained in the hardening of the high-speed types. On the other hand, some authorities claim that placing the tool or die in the furnace when the latter is at the hardening temperature has no deleterious effect, especially if precautions are taken to avoid placing the work directly on the hot furnace hearth. This can be guarded against by the use of a tray made of alundum or carbofrax placed in the furnace just prior to the introduction of the work. The contention put forth by the adherents to the latter procedure is that the tool should be allowed to heat naturally in the furnace to the hardening temperature.

In the case of the high-carbon high-chromium and other very high alloy hot-die steels, it is recommended that a preheat temperature of approximately 1400°F be used before taking the steel up to the hardening temperature, which temperature will range from approximately 1700°F to 2000°F for these types. In the case of high-speed steels, it is recommended that a preheat temperature of 1500° to 1600°F be used. The reason for using preheating in the case of these steels is to allow the tool to come to a uniform temperature before the run up to the hardening temperature is undertaken. Due to the high percentage of alloys in these steels, particularly in the case of chromium, considerable retardation of the heating rate exists as compared to that encountered in the oil and water-hardening types. Preheating, when employed, also avoids the danger of burning the edges or thin sections of the tool, while at the same time insuring that the work is uniformly heated throughout before quenching takes place.

There has always been some doubt as to the correct soaking time which should be used prior to the quench when a hardening treatment is being practiced. It has been proposed by some that the temperature at the center of the work lags far behind that of the case during heating. In order to clarify this point, one of the prominent tool steel manufacturers conducted an experiment designed to determine the difference in heating rate between the case and core of a 3-in. diam bar when it was introduced into a furnace held at a temperature above the critical point.

The sample of steel used in this experiment measured 6 in. in length. A thermocouple was attached to the case of the specimen at its midlength and a second thermocouple was inserted through the core of the specimen so that it would measure the temperature at the exact center of the specimen. The specimen was then introduced into a furnace maintained at 1450°F and was allowed to come to temperature normally.

Fig. 1 shows the two curves which were registered by the two thermocouples as the specimen heated from room temperature up to 1450°F. Examination

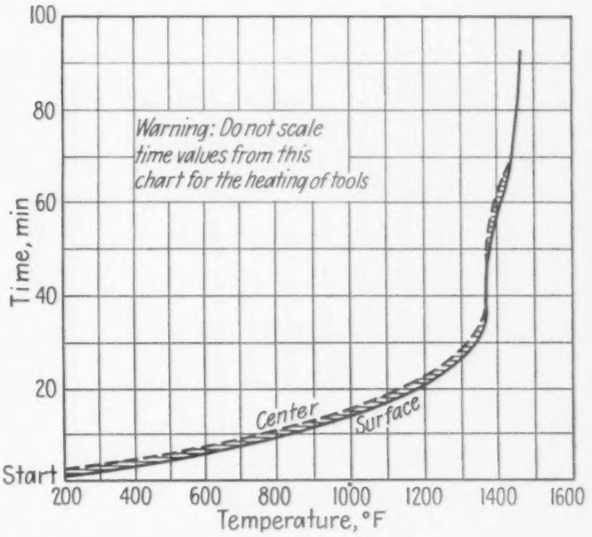

FIG 1—Heating curves (center and surface) for tool steel specimen 3 in. round and 6 in. long heated to 1450°F (Carpenter Steel Co.).

of the curve shows that at no point did any appreciable difference in temperature exist between the center and the outside, there being some slight lag of the core temperature behind the case temperature in the early stages of heating. It will be noted, however, that during the last 30° the two thermocouples registered the same temperature; in other words, the core and case temperature moved exactly together through the last 30° to the 1450°F furnace temperature.

The nature of the curve in the 1350° to 1450°F

TABLE IV

Common Tool and Die Steels—Heat Treating Practice

	Preheat Temp., °F	Hardening Temp., °F	Quenching Medium	Tempering Temp., °F
1	.....	1450-1500	[1]Brine or Water	300-500
2	.....	1450-1500	[1]Brine or Water	300-550
3	.....	1400-1475	[1]Brine or Water	300-550
4	.....	1450-1500	Brine or Water	350-550
5	.....	1425-1450	Brine or Water	300-550
		1550-1600	Oil	300-550
6	.....	1550-1625	Oil	600-1000
7	1300	1500-1625	Oil	350-550
8	1200	1450-1500	Oil	325-500
9	1200	1425-1475	Oil	325-500
10	.....	1650-1750	Oil	350-650+
11	12-1300	1525-1550	Brine or Water	300-600
12	14-1500	1750-1825	Fan Blast	800-1100
13	14-1500	1625-1800	Still Air	600-1100
14	1500-1550	1950-2150	Air or Oil	1000-1250
15	1500-1550	2100-2150	Oil	600
		2050-2100	Air	1000
16	.....	1850-1750	Oil	500-600+
		1550-1600	Water	450-600+
17	1575-1675	1575-1675	Brine or Water	350-700
18	.....	1525-1575	Brine or Water	350-700
19	1500	1700-1825	Oil	400-1000
20	1500	1700-1800	Oil	400-1000
21	1500	1800-1900	Air	400-1000
22	1500	1800-1900	Air	400-1000
23	1450-1600	2250-2350		1000-1150
24	1450-1600	2200-2300		1000-1150
25	1450-1600	2300-2350	Oil,	1000-1150
26	1400-1500	2200-2350	Air,	950-1100
27	1400-1500	2200-2250	or	950-1100
28	1500-1600	2350-2400	Molten	950-1100
29	1500-1600	2325-2375	bath at	950-1100
30	1500-1600	2325-2375	800-1100°F.	1000-1150
31	1500-1600	2325-2375		1000-1150
32	1300-1550	2200-2250		1000-1150

[1] Small sizes 3/16 in. round and smaller will harden from 1500 to 1525°F by oil quench.

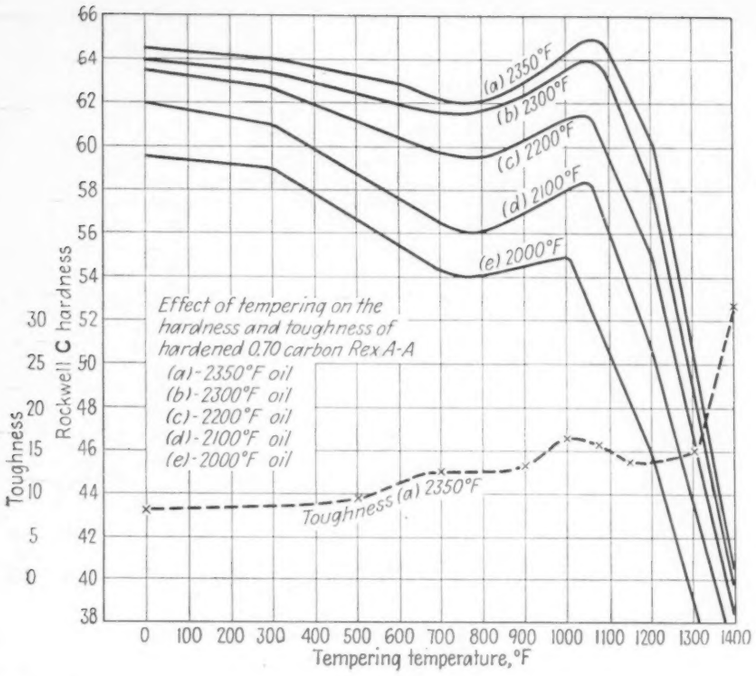

FIG. 2—Average hardness values at various quenching and tempering temperatures for an 18-4-1 high-speed steel (Crucible Steel Co.).

range indicates that complete transition has taken place when the steel has moved through the critical temperature zone. This indicates that the steel has completely changed or, in other words, transformed to the austenitic state and is thus in a condition which will permit full hardening to take place, the depth of hardening being dependent on the rate of cooling and the hardenability of the steel being treated. In other words, the steel, if a high-carbon type, will be fully capable of hardening if quenched upon reaching the 1450°F mark.

There is little to be gained by employing a longer soaking time at this temperature (hardening temperature) when tools made of the water quenching or non-deforming oil-hardening types are employed. True, with these steels, it is possible to obtain a slight increase in hardenability, or in other words, an increase in depth of hardness by holding for longer times at this temperature which will make for a large grain size conducive to obtaining a greater depth of hardness. Holding at temperature, however, also makes for excessive decarburization and scaling, if atmosphere control is inadequate. Also, the larger grain size which is thus obtained lowers the toughness or in other words, increases the brittleness of the steel. A good rule to follow in the hardening of the water-hardening and low alloy oil-hardening types of tool steels is that the work should be maintained at temperature only 5 min per in. of maximum section. This is only to insure that thorough heating of the work has been obtained.

In the case of the higher alloy oil-hardening, air-hardening steels such as high-carbon high-chromium and like steels, it is advisable to allow a little longer soaking time due to the more sluggish nature of the steel caused by the presence of alloys such as chromium and tungsten, which tend to slow up transformation and carbide solution. The accepted rule for gaging the soaking time for these steels is to allow 10 to 15 min per in. of maximum section of the work being treated. Experience has shown that soaking time on the order of 20 min or more per in. may be needed with some lots of high-carbon high-chromium steel in order to insure complete solution of the ferrite and thus enable full hardness to be attained.

The soaking time employed for high-speed steels at the hardening temperature is figured in much the same way as in the case of the water and oil-hardening types. When temperatures above 1500°F are reached, heat transfers so fast that no appreciable differences will be found between the core and case of the sections which are generally used when high-speed steels are used. Tools, especially those of the cutting types, made from the high-speed type steels should be removed from the furnace and quenched immediately after they have reached the hardening temperature. If this is not done, there is every danger that burning of the edges and thin sections of the tool will take place and also excessive solution of carbides will lower the toughness of the steel. There are certain exceptions to the above rules; however, if these rules are followed, success will generally be assured in this phase of the hardening heat treatment.

Correct temperatures for the heat treatment of any brand and type of tool steel have been determined by the tool steel manufacturers, and their recommendations should be followed. There is generally a range of temperatures specified, such as from 1425° to 1475°F in the case of most water-hardening low temper steels. Whether or not the high, low, or average temperature for this range is used, generally depends on the section of the work and its application. As a general rule, where the section is on the small side, the lower temperature range should be favored. Where a little greater depth of hardness, or in other words, a slight increase in hardenability is desired, the high side of the temperature range is used. It is generally safe in normal practice, if the correct steel has been specified for the job, to use a hardening temperature favoring the low side of the temperature range recommended for the steel in question. This will insure the best combination of hardness and toughness. It is, of course, very important that the minimum required hardening temperature be reached if full hardness is to be obtained. This is clearly brought out in the chart shown in fig. 2 which illustrates the hardness peaks which may be obtained on straight 18-4-1 high-speed steel quenched from hardening temperatures ranging from 2350° to 2000°F.

Next week the author will consider decarburization and its prevention, including use of proper furnace atmospheres.—Ed.

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*Section Key—B = Classification of tool steels; D = heating of tool stels; E = decarburization; F = furnace atmospheres; G = quenching; H = tempering; J = liquid salt baths; K = isothermal heat treatment.

New Method for Polishing Silver Plate

ACCIDENTAL use of a silver plated wire in cleaning phosphor bronze electrolytically, has led to the development of a new polishing method which, according to officials of Westinghouse Electric Corp., Pittsburgh, may result in considerable change in practices in the silver industry. Credit for developing this novel electropolishing method is given to D. R. Turner of the electronics department of the research laboratories of the company. Cyanide was said to be the chief factor in the accident that lead to the discovery. Turner had added some cyanide to an electrocleaning solution when dime-sized phosphor bronze diaphragms for microwave tubes proved particularly difficult to wash. One of these diaphragms had been suspended in the bath, through which an alternating current was passing, by a strand of wire previously used to impress some object being silverplated. The wire was dull white in appearance as silver plate is before being polished, but when the phosphor bronze diaphragm was lifted out of the solution, the piece of silver wire had taken on a high luster. This led to the belief that by accident, Turner had found a method of electropolishing silver plate.

This experience led to a series of experiments in which it was found that the best results were achieved from immersing the silver plated object in a bath of cyanide solution normal to the regular plating operation. However, instead of using negative current in the bath, positive current is used in about four times the amperage used to plate the metal, but not continuously. The positive energy is applied for a few seconds, interrupted, then sent through the bath again and this intermittent action repeated for several cycles. When the article has reached its peak of luster, it is taken out of the bath, rinsed and dried.

Although this electrolytic polish can be effected just as well by employing a plain cyanide solution, it was pointed out that the more practical way was to utilize the same cyanide bath used to plate the objects.

Ideal industrial practice, according to Turner, would be to immerse the metal pieces, many at a time, sending through negative current to silver plate, then intermittent positive charges to obtain the bright finish.

This new method has proven so successful at Westinghouse that it is being used by the company to polish silvered contactors, switchgear parts, microwave apparatus and other items which heretofore have been buffed. The company is also extending its investigations of this process to determine its effectiveness and its field of application.

Cr-Mo Steels Tested at 900° to 1000° F

THREE carbon and six molybdenum steels were heated at 900° to 1000°F over periods up to 5000 hr and examined for hardness and microstructure. The hardness of most carbon steels first increased slightly with time, and then decreased; the changes were not affected by deoxidation, according to Smith, Miller and Torr, in *Combustion* 17, 1945, 3, 41-4. The maximum increase was found for the annealed samples held at 1000°F. The hardness of the molybdenum steels followed the general pattern of that of the carbon steels; however, the hardness of the normalized samples increased initially (more slowly, but to a higher value the lower the temperature) and then decreased in a way characteristic of precipitation hardening systems. Spheroidization was generally more rapid in the normalized steels than in the annealed steels, but this effect was less marked in the carbon steels. In the normalized carbon steels the rate was highest in the titanium treated steels. In the molybdenum steels the rate increased with increasing silicon plus aluminum addition. Large aluminum addition without silicon was associated with a lower rate, probably owing to a coarser initial microstructure. Graphite formed in all carbon steels, and at about the same rate in normalized and annealed specimens. In the six molybdenum steels, it formed only in the three to which aluminum had been added; in these the rate seemed to be the greater the higher the silicon content.

German Welding Rod Manufacture

Information on the development and manufacture of welding rods in wartime Germany, obtained by the author during the summer of 1945 at the Deutsche Edelstahlwerke, Bochum, and the Edelstahlwerke of Gebruder Bohler, near Dusseldorf, is described herein. Rod and coating composition for a wide variety of German rods are given.

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IN electrodes for welding joints on thick-walled armor plate for tanks the following characteristics were desired: (1) Good weldability and freedom from cracks, and (2) impact strength high enough to be satisfactory against ballistic testing at – 76°F.

During the first part of the war, as the quality requirements for tanks were increased, manufacturers supplied electrodes with continually increasing alloy content. These were characterized by a completely austenitic structure which has a high degree of toughness over a considerable range of temperature. The higher alloy content of electrodes was necessary because the thickness of the tank plates was increased, and a higher stress in the weld resulted.

On account of the shortage of alloys which were used on various types of war equipment, the manufacturers were told to change from a high alloy to a low alloy electrode without sacrificing the quality of the welds made on tanks.

At the beginning of the war when the thickness of tank plates was about 1½ in., a Cr-Mn austenitic electrode was used. This electrode satisfied the requirements outlined under No. 1 above, but at low temperatures the weld became brittle and would not stand ballistic shock. To overcome this difficulty, an Mn-Cr electrode with about 20 pct Mn and 12 pct Cr was developed which had toughness superior to the first electrode. As the thickness of the plates increased, the higher alloy Cr-Mn electrode was not entirely satisfactory since cracks often developed in the weld due to the high stresses involved. At this time it was necessary to change to a Cr-Mn-Ni alloy with about 20 pct Cr, 8 pct Mn and 9 pct Ni. This alloy has been shown to be entirely satisfactory on all types of tests. Ballistic plates were made and tested at temperatures as low as – 76°F, at which temperature the Cr-Mn-Ni electrode gave by far the best results of all the previous electrodes. Due to the scarcity of alloying elements austenitic electrodes were available for only the first layer of the weld, while low alloy electrodes were used for the remainder of the joint. The austenitic electrode was used in the root pass since this is subject to the greatest stresses.

Good results when using low alloy welding rod, depends primarily upon the composition of the coating rather than of the rod. Ferromanganese, and ferrosilicon were added to the deposit through the coating in order to produce a well deoxidized weld. In addition, these alloys improved the tensile properties. The analyses of the four types of alloys are shown in table I.

Coatings were applied to the rods, using hydraulic extruders. The coatings used were:

(1) For austenitic rods:

48 pct fluorspar
3 pct ferromanganese
6 pct artificial rutile
1 pct kaolin
2 pct sodium carbonate

TABLE I

Chemical Analysis of German Alloy Welding Rods

Type of Alloy	Trade Name	C	Mn	Si	Cr	Ni
Cr-Mn	Thermanit M	0.10	10.0	0.60	17.5	2.0
Cr-Mn	Thermanit P	0.12	19.5	1.50	12.5	1.5
Cr-Mn-Ni	Thermanit X	0.12	8.0	0.80	19.5	9.0
Unalloyed	PSU	0.08	0.4	0.05	.....	.....

TABLE II

Mech. Properties of German Alloy Welding Rods

Type of Alloy	Trade Name	Yield, Psi	Tensile, Psi	Elongation, Pct	Reduction, Pct	Mkg per cm² Impact
Cr-Mn	Thermanit M	57,000	85,000	12	15	3
Cr-Mn	Thermanit P	57,000	100,000	40	45	12
Cr-Mn-Ni	Thermanit X	45,000	85,000	45	45	18
Unalloyed	PSU	45,000	68,000	30	60	16

Additional information on German wartime welding practices and equipment are contained in the following articles previously published in THE IRON AGE; *"Arc Welding Trends in Wartime Germany," Feb. 7, 1946; "Ship Welding in Germany," Mar. 21, 1946; "German Welding Equipment," Apr 25, 1946.*

TABLE III

Chemical Analysis of Bare Welding Wire for Various Applications

(Gebruder Bohler)

General Purpose Welding

Name	C	Mn	Si	Ni	Al	Ti	Zr	Remarks
BW XII	0.10	1.30	0.10	0.40	....	....	....	Gas welding
EM IV	0.14	3.00	0.12	....	....	....	....	Ellire welding
B-Elite	0.10	0.65	0.12	....	....	....	....	Core electrodes
B-Elite KVA	0.18	1.10	0.60	....	0.10	....	0.30	Core electrodes
B-Elite HS	0.20	1.50	0.20	....	0.15	0.25	....	Core electrodes

For Rebuilding Work, Bare Wires, Arc and Gas Welding

Name	C	Mn	Si	Cr	Al	Ti	
B H S	0.25	1.50	0.20	....	0.15	0.25	
B I H	0.30	1.10	0.20	1.00	Trace	0.20	
Dur 500	1.00	1.80	0.25	1.80	0.10	0.20	
BM	1.10	13.00	0.25	....	....	....	

For Repairing High Speed Tools

Name	C	Mn	Si	Cr	W	Mo	V	Remarks
Rapidit M	1.10	....	4.30	....	2.40	2.40	2.80	Gas welding with fluxes.
Rapidit MA	1.45	....	4.30	....	2.40	2.40	2.80	Arcatom welding.
Rapidit W	1.20	0.35	0.35	4.30	10.50	....	4.30	Coated arc. See table IV.
Rapidit WA	1.60	0.35	0.35	4.30	10.50	....	4.30	Arcatom welding.

For Hard Facing

Name	C	Mn	Cr	W	Mo	CO	
Celsit V-300	1.70	....	28.00	6.00	....	33.00	
Celsit V-400	1.60	....	26.00	4.50	4.50	20.00	
Celsit VEO	1.90	....	30.00	....	....	....	
Ledurit Z IV	2.50	0.80	4.30	....	....	....	

(2) For low alloy rods:
52 pct fluorspar
29 pct marble
4 pct ferrotitanium
5 pct ferrosilicon
6 pct ferromanganese
2½ pct bentonite
1½ pct sodium carbonate

Typical mechanical properties of the four types of rod are shown in table II; it will be noted that with increasing alloy content, the toughness was improved on austenitic material.

The greater part of the production of high alloy electrodes was melted in basic electric arc furnaces and the remainder was melted in basic high frequency induction furnaces. The latter process was at a disadvantage since it used a basic crucible liner which was not as durable as an acid liner. After many experiments, a compound crucible was devised which overcame this difficulty so that greater production could be obtained from these furnaces. The capacity of the electric arc furnaces was 8 to 15 tons, while that of the high frequency furnace was 2 to 6 tons. The total high alloy electrode steel production at Deutche Edelstahlwerke was approximately 150 to 200 tons a month, while the equipment used for manufacturing this product could produce 300 tons per month.

Round, rough-turned ingots were hammered down to billets approximately 2 in. square. The billets were then rolled to approximately ¼ in. rod wire. The working temperatures were about 1925° to 2012°F. The yield, based on hot-rolled rod, was approximately 60 pct of the ingot weight. After rolling and between some of the passes during cold-drawing, it was necessary to anneal the steel. The high alloy materials were water quenched from the region of solid solution (around 2000°F). The low alloy material was annealed to lamellar pearlite by annealing in the range of the Ac_1 temperature.

Eight single drawing benches were available at Bochum for cold-drawing electrode wire. Sintered hard metal tools (carbide) were used as drawing dies. These dies had a cone angle of 14 to 18°. Before drawing, the annealed coils weighing 44 to 66 lb, were pickled. The following solutions were used:

Solution Compositions

Steel Pickled	Pct H_2O	Pct HCl	Pct HNO_3	Pct HF
High alloy	45	45	4	6
Low alloy	60	40	..	..

TABLE IV

Chemical Analyses of Coating Compositions

Fox MSU, Gebruder Bohler
Core Wire: C 0.14, Si 0.02, Mn 0.60
Coating:

Rutile	50 parts
Calcium carbonate	20
Mica	10
Magnesite	2
Calcium fluoride	2
FeMn (6 pct C)	6
FeMn (1 pct C)	6
Milk Sugar	1
Wood Flour	1
Soda	1
Binder—Potassium and sodium silicate	

Type of coating: Rutile (mild steel)
Current: Ac/dc
Coating thickness: Medium

Fox UME, Gebruder Bohler
Core Wire: C 0.14, Si 0.02, Mn 0.60
Coating:

Feldspar	25 parts
Calcium carbonate	10
Ilmenite	35
Magnesite	10
FeMn (1 pct C)	15
Milk sugar	2
Soda	1
Binder—Potassium silicate	

Type of coating: Ilmenite (Mild Steel)
Current: Ac/dc
Coating thickness: Heavy

Fox PNA, Gebruder Bohler
Core Wire: C 0.08, Si 0.02, Mn 0.50
Coating:

Calcium Fluoride	44 parts
Calcium carbonate (chalk)	44
Calcium carbonate (quartz)	12
FeMn (1 pct C)	7
Soda	2
Rutile	3
FeSi (45 pct)	5
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

Fox LCV3, (aircraft construction) Gebruder Bohler
Core Wire: C 0.30, Si 0.40, Mn 0.60, Cr 2.50, V 0.25
Coating:

Feldspar	12 parts
Calcium carbonate (quartz)	10
Rutile	36
Magnesite	20
FeMn (1 pct C)	20
Lime Spar	5
Kaolin	10
Soda	2
Binder—Sodium and potassium silicate	

Type of coating: Titanium dioxide, all mineral
Current: Ac/dc or straight polarity
Coating thickness: Heavy

Fox A7, For high hardening and austenitic Manganese steels. Gebruder Bohler
Core Wire: C 0.20, Cr 19.00, Ni 8.00, Mn 5.50
Coating:

Calcium fluoride	54 parts
Lime spar	42
Calcium carbonate (quartz)	2
FeTi	4
Soda	3
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

Fox AN, For high hardening steels and for use at elevated temperatures. Gebruder Bohler
Core Wire: C 0.10, Si 0.90, Mn 1.70, Cr 24.00, Ni 18.00, V 0.10, Ti 0.05
Coating:

Calcium fluoride	40 parts
Lime spar	33
Mn metal	7
FeMn (1 pct C)	6
FeTi (30 pct)	4
FeMo	1
Sodium hydroxide	0.3
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

Stainless Steels, Gebruder Bohler
Core Wire: Fox SAS2 C 0.08, Si 0.70, Mn 0.80, Cr 18.00, Ni 8.50, Ta and Cb 1.00
Fox SAS4 C 0.10, Si 0.70, Mn 0.80, Cr 18.00, Ni 9.50, Mo 2.40, Ta and Cb 1.00
Coating:

Calcium fluoride	45 parts
Calcium carbonate (chalk)	35
FeSi (45 pct)	10
Soda	2
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

Rapidit (High Speed) Gebruder Bohler
Core Wire: C 1.20, Si 0.35, Mn 0.35, Cr 4.30, W 10.50, V 4.30
Coating:

Calcium fluoride	47 parts
Calcium carbonate (chalk)	35
Calcium carbonate (quartz)	10
FeMn (1 pct C)	5
FeTi (30 pct)	2
Cr metal	1
Soda	3
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

For Armor Welding. (Deutche Edelstahlwerke, Bochum)
Core Wire:
Thermanit M C 0.10, Mn 10.00, Si 0.60, Cr 17.5, Ni 2.00
Thermanit P C 0.12, Mn 19.50, Si 1.50, Cr 12.5, Ni 1.50
Thermanit X C 0.12, Mn 8.00, Si 0.80, Cr 19.5, Ni 9.00
Coating:

Calcium fluoride	48 parts
Calcium carbonate (marble)	40
FeMn	3
Rutile	6
Kaolin	1
Soda	2
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

PSU, For Armor Welding. (Deutche Edelstahlwerke, Bochum)
Core Wire: C 0.08, Mn 0.40, Si 0.05
Coating:

Calcium fluoride	52 parts
Calcium carbonate (marble)	29
FeTi	4
FeSi	5
FeMn	6
Bentonite	2.5
Soda	1.5
Binder—Sodium silicate	

Type of coating: Lime, all mineral
Current: Dc
Coating thickness: Heavy

The temperature of the pickling solution was approximately 140°F. After the coils were removed from the pickling vat they were washed off in water, neutralized by dipping in a solution of lime, then dried in a gas-fired rotary furnace at 158° to 212°F.

The drawing speed varied according to the type and thickness of the wire. The following speeds and cross-section reductions were used:

Austenitic Wire

Wire Thickness, In.	Drawing Speed, Fpm	Diameter Reduction, In.
1/4 to 5/32	66 to 78	0.040
5/32 to 1/8	86 to 92	0.027 to 0.031
1/8	100 to 115	0.016 to 0.031

The drawing speed for all sizes of unalloyed wire was 300 ft per min.

The austenitic wire was annealed and pickled after every two passes, while the unalloyed steel was drawn from the rolling size to finish dimension with no additional annealing. The wire was then straightened and cut to lengths of 13¾, 15¾ and 17¾ in., depending upon the electrode diameter.

The following presses were available at the Bochum plant for extruding:

Three vertical single cylinder presses.
One vertical double cylinder press.
One horizontal spindle press, with two extruding heads.

The coating ingredients as outlined previously were diluted with 20 pct sodium silicate to bring them to the correct consistency for extrusion. The pressure used for extrusion was 2940 to 4400 psi for austenitic core wire and 4400 to 5880 psi for unalloyed wire. The coating thickness was governed by the wire diameter but unalloyed electrodes required thicker coatings than the high-alloyed rods for the same sizes.

After extruding, the coatings were dried as follows:

(1) Dry 2 to 4 hr in air.
(2) Dry in gas-fired furnace, 122° to 194°F.
(3) Finish drying in electric air circulating ovens at 482° to 662°F for austenitic materials and 752° to 842°F for unalloyed electrodes.

The grip end and striking end of the electrodes were stripped between the second and third drying cycles. Electrode production was carefully controlled since it was thought that the weld deposit was very sensitive to small changes in analysis, production treatment, and coating manufacture. Each batch was analyzed to be sure that the weld deposit had the correct chemistry. Before a heat was used for electrode steel, a pilot lot was made to test the weldability and toughness of the heat.

Each new coating modification was fully investigated before it was used. During the press operation, the rods were watched carefully to ascertain that the coating was not eccentric. Before packing, a final inspection was made to assure that the correct surface condition, weldability, and dryness of the coating was as specified.

There do not appear to be many points of unusual interest in the composition of the steels used. Each is probably suitable and soundly chosen for the purpose stated, taking into consideration the materials which were available. There is a definite indication throughout the alloy compositions reflecting the scarcity of certain alloying elements, particularly nickel and molybdenum.

Fox LCV$_3$, for airplane construction, was evidently used for applications where X-4130 was used in this country.

The analyses of the austenitic steels used were somewhat similar to those used in the United States, although containing generally less nickel and more manganese than the comparable American compositions. It is interesting to note that the manganese content of Thermanit X was entirely in the core wire and none added through the coating.

The Fox AN core wire contains lower amounts of chromium and nickel than Type 310 but it is believed that the deposit even with considerable deletion, should still be completely austenitic. Since the silicon percentage shown, taken as an average figure, is higher than the maximum permitted by specifications in this country, it would appear that the Germans did not find that silicon contributed to cracking in this type of deposit. The small amounts of vanadium and titanium present in this grade are interesting to note.

The Fox SAS$_2$ and Fox SAS$_4$ are quite similar to American types 347 and 316 respectively, considerable amounts of columbium, specified as tantalum and columbium, were apparently standard in both grades.

For hard facing, Celsit V-400 and V-500 are obviously iron base substitutes for cobalt base alloys. It is to be expected that the resistance to wear of deposits of these alloys would be inferior to those manufactured in this country.

As regards Celsit VEO, the writer is not familiar with any equivalent welding rod of American manufacture. In all probability the deposit, as cooled from a welding heat, would be austenitic. This composition might well be a satisfactory one for resistance to abrasion.

The BN rod, for rebuilding work, corresponds to Hadfield manganese steel. It is believed to be common practice in this country to add approximately 3 pct nickel to the composition. This produces a more stable austenite in the deposit and is said to make the weld less prone to cracking, although probably resulting in a somewhat lower hardness in the work hardened condition.

Mineral Lime Base Coatings

The Germans apparently used all mineral lime base coatings for 18-8, 25-20 and other high alloy types of electrodes, and either semimineral or all mineral lime base coatings for mild steel and low alloy types of electrodes. American manufacturers have used both mineral lime and titanium dioxide base coatings on the higher alloy electrodes, and either a rutile, semimineral or organic coating on mild steel rods. The rutile coating is usually preferred for mild steel electrodes because it possesses good weldability and is an all position general purpose rod for ac and dc operation.

The extensive use of lime base coatings for stainless and similar high alloys may indicate that minimum alloy loss due to oxidation was an important criterion in German coating development. Also, weldability apparently was of secondary importance since titanium dioxide coatings would have improved weldability to a great degree, especially in flat and horizontal welding fabrication.

The Germans were sound in using lime base fluxes which contained little or no constituents with combined moisture, and for this reason apparently never

encountered flake in 25-20 alloys. Lime base coatings could also be dried at higher temperatures, thus insuring a minimum of moisture present in the dried flux. The simplicity of German formulation makes apparent the trend to disregard weldability. Almost all formulas provide only the barest essentials required for metal deposition. American formulas are much more complex due to the attention given to such requisites as minimum spatter, easy slag removal, flatness of bead, smoothness of arc, etc.

The Germans apparently were well aware of the fact that fluorine is detrimental to ac arc characteristics, and provided basic metal ions in the form of sodium and potassium to support arc stability in accordance with atomic arc reactions.

The extensive use of ferrotitanium is interesting, if not important. Its use as a deoxidizer is apparent, but the possibility of titanium used as a getter for hydrogen is logical because titanium hydride is stable at arcing temperatures.

The extrusion pressures used by the Germans are comparable to those used in this country. The drying procedure, however, must have been difficult to incorporate into any scheme of quantity production. American electrodes have grip ends brushed prior to drying, and the actual drying is accomplished in only one continuous oven. The German drying procedure requires too much handling, thus cutting production. However, their relatively high finishing temperatures should prove to be an advantage in respect to minimum moisture content. The German brushing operation occurred after the second drying period because the coating was extruded in a less viscous state than are American coatings. Their coatings were wetter due to the fact that soda additions had to be dissolved in water, and also because the binder had to be diluted, specific gravity lowered. This dilution must be accomplished in order to prevent precipitation of silicic acid from the colloidal silicate or binder. If precipitation occurs the binder loses all lubricating properties.

German formulas are criticizable relative to the high fluoride contents and kaolin additions. In some cases coatings contained as much as 50 pct calcium fluoride, whereas American fluoride additions seldom exceed 35 to 40 pct. Kaolin was probably used to ease slag removal. This is a predominately bad feature of lime base coatings. However, this aluminum silicate contains approximately 7 pct combined moisture, which is not affected even at 900°F, and therefore impossible to remove with the drying cycles reported.

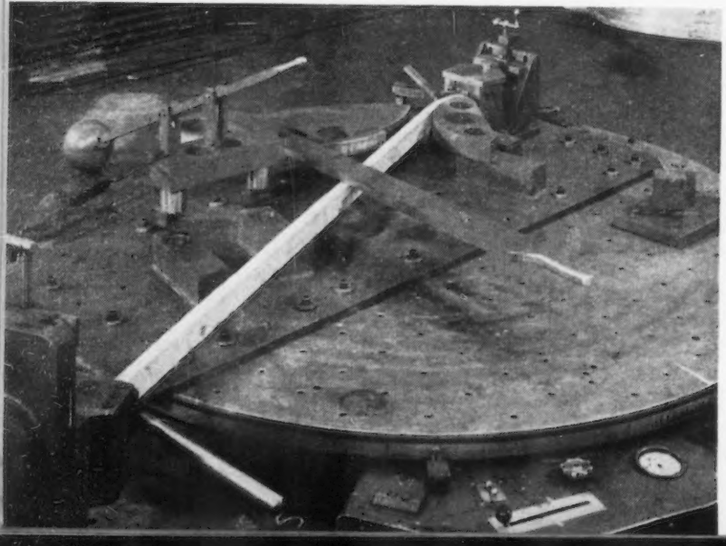
Contour Forming Solves Bending Problems

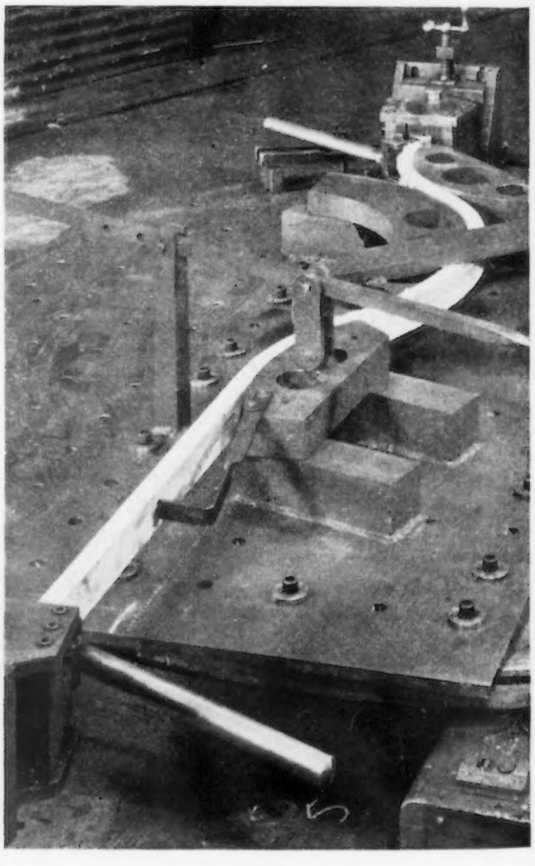
RE-FORMING metal sections, received in straight lines or prior curves, into varied other shapes, is an old art long practiced by blacksmiths. In more modern times the bulldozer or power press is commonly applied to this work, but there are a great many cases where this equipment is not at all satisfactory. For this reason the Cyril Bath Co., Cleveland, has developed a process known as contour forming, and has announced a line of contour-forming machines. By use of this equipment it is possible to create shapes not feasible with single or double press action, and there is a definite economy in their use.

In many cases, particularly, though by no means exclusively, in aircraft work, it is desired to form a constant section element into curved shapes which must be held very accurately, but at the same time the cross section must be changed during the bending process. For example, the attaching angles by which the wing

FIG. 1—The three steps in forming a reverse channel bend by contour forming (a, b, c) are clearly shown. The metal is stretched into position, the table reversing during the process.

A

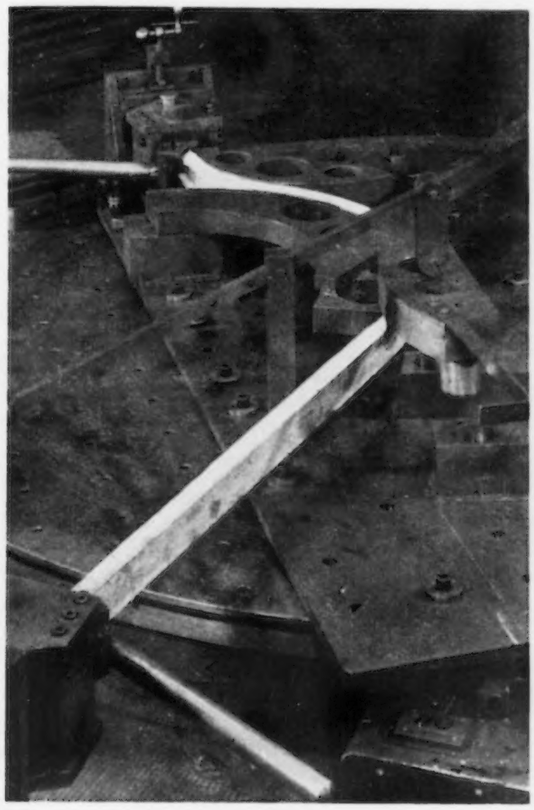




B

tips of an aircraft are bolted to the center section may be received as a simple right angle extrusion, but the angle must be continuously varied so that one leg presents a flat surface for bolting while the other follows the curve and angle of the skin to which it is attached. Furthermore, such bends must be very accurate to avoid bolt and rivet strain.

It has been found from experience that work of this nature tends to divide into two classes, (1) that which can be done by stretching, and (2) that which will handle better under compression forming. The latter process involves either wiping, rolling, or forming with tangent bars. Some work, as in long, difficult, hollow shape forming, such as rectangular tubes, requires a combination of both methods. The new machines have, therefore, been designed so as to be readily adapted to either process. Many forms also run into complete circles or spiral members, and cannot be formed conveniently on rolls either because of their shape, or in the case of stainless steels or aluminum alloys, because



C

springback makes duplication very difficult. This difficulty has also been overcome in the contour former, which will produce complete circles or spirals, or anything up to that point, including straight lines, reverse bends, or bends in several planes. Fig. 1 shows various steps in forming a channel with a double bend. Bending of tough alloy steel for trailer rub rails and bus bumpers offers another wide field for this machine, as shown in fig. 2.

Each particular bending job presents its own problems, depending largely upon the type of material and the shape of the part. If it is a high alloy material, stretching is almost invariably indicated, as this material will not form reliably by compression. If, on the other hand, it is 1020 steel, or low alloy aluminum, or stainless, compression bending may be preferable, particularly if there are prepunched holes which generally preclude stretch forming.

One of the most difficult types of bend is that shown in fig. 3, but even this can be successfully performed on this new equipment. It is not intended to compete with press type operations where these can be successfully performed, but is applicable for those bends which are outside the range of standard equipment.

FIG. 2—Forming heavy, alloy steel bumpers for busses becomes a relatively simple operation on a contour former.

FIG. 3—Difficult bends such as those shown here are outside the range of ordinary press operations, but may be made without difficulty by contour forming.

Ladle Reactions In Rimmed Steel

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A discussion of ladle reactions in rimmed steel directed toward defining conditions which may prevent such reactions is presented in this article. Employing the statistical approach, the authors examine the interrelationship of such factors as FeO, carbon, final minus preliminary manganese, silicon additions and manganese drop during pouring.

IN an earlier discussion[1] of ladle reactions in rimmed steel, some relations were disclosed which merit a more detailed presentation than was possible at that time. In view of the general interest in this subject, this article will consider these ladle reactions in greater detail.

This discussion is limited to rimmed steel because ladle reactions of a slightly different type are encountered in killed steel, the latter reactions being chiefly related to an increase in the phosphorus content of the steel, and commonly described as a phosphorus reversion. In rimmed steel the reaction occurs as a boil in the steel and usually results in a loss of manganese from the steel to the slag. The steel pourer usually realizes that a reaction is taking place when he feels a boil on the stopper rod while he is pouring a heat. It is our common practice to add fine 50 pct ferrosilicon to the slag to prevent further reaction. This basis of describing a ladle reaction is believed to be more objective than selecting heats with a manganese drop greater than some arbitrary value.

It can be seen that there are three criteria for statistically describing a ladle reaction which has occurred on rimmed steel: The time when the reaction occurred is fixed by the ingot number, or fraction of the heat which has been poured when the reaction is felt by the steel pourer; the extent of the reaction is measured by the drop in manganese content of the steel from the first to last ladle test, and the degree or strength of the reaction is measured by the amount of ferrosilicon necessary to stop it.

A group of heats was selected for study from a three-month period, the last quarter of 1945. The relationship of various factors to the ladle reaction is indicated in tables I and II.

As shown in table I, the heats which react late (that is when pouring the last few ingots) when there is relatively more slag and less slag in the ladle and when the slag is colder, are characterized by being larger heats, by having less skull, and, in the case of soft melting heats, by having had a larger amount of hot metal used in working the heat as compared with those that react while pouring the first few ingots. The heats that react while pouring the middle part of the heat are, for the most part, intermediate in respect to heat size and skull, but their position with respect to hot metal is not so clearly defined. The first two and possibly the third

[1] *"Ladle Reactions in Rimmed Steel," by R. C. Diehl, AIME Open Hearth and Blast Furnace Conference, Chicago,* 1946.

TABLE I

Factors Related to Time of Ladle Reaction

Time of Reaction	Number of Heats	Heat Size, Tons, Avg.	Weight of Skull Lb, Avg.	Mn Increase Preliminary to 1st Ladle Pct Mn, Avg.	FeO in Furnace Slag Pct, Avg.	Extra Metal	
						Number of Heats	Weight Average,
First 1/4 of heat	32	153	3600	0.185	19.7	13	14,400
1/4 to 1/2	52	157	2540	0.212	20.2	14	19,500
1/2 to 3/4	44	159	1500	0.206	19.3	17	16,500
Last 1/4	5	160	1400	0.258	21.7	1	25,000

TABLE II

Factors Related to Points of Manganese Lost During Ladle Reaction

Difference 1st Ladle Test minus 2nd Ladle Test Pct Mn	Number of Heats	Mn Pct 1st Ladle Test Average	Mn Pct Increase Preliminary to 1st Ladle Test Average	Carbon Pct 1st Ladle Test Average	FeO Pct in Furnace Slag Average	Extra Metal	
						Number of Heats	Weight, Lb Average
Second test higher	5	0.29	0.196	0.088	23.4	1	10,000
No difference	11	0.31	0.189	0.095	17.0	3	15,000
0.01	29	0.29	0.155	0.091	18.6	10	18,700
0.02	32	0.32	0.204	0.090	20.5	8	15,125
0.03	27	0.35	0.237	0.094	19.3	12	15,250
0.04	18	0.35	0.233	0.086	19.5	7	18,570
Over 0.04	11	0.36	0.247	0.095	22.9	4	22,500

relation are curvilinear and are self evident.

The general methods of comparing the averages of sub-groups as used in tables I and II are useful in showing general trends and relations, but are occasionally misleading because the sub-groups are usually of different sizes and therefore there are a few values in one group which exert a large effect, while a large number of values in another group will exert a very slight effect. By studying the relations statistically, each value (in this case each heat) is studied as an individual and exerts an equal force in determining the effect of any one factor on any other factor.

The factors selected for further study are FeO, carbon, final minus preliminary manganese, weight of silicon added, mold number where the reaction occurred and manganese drop during pouring. Table III shows the average and the standard deviation of each of the above factors and the correlation coefficient or effect exerted by each factor on each of the others. When a group of 133 values are picked at random from an unlimited number of samples having no relation to each other, it is possible that this group of 133 could have a correlation coefficient of 0.174, though unrelated.

As an example of the correlation coefficient of a pair of factors of known high relation it is interesting to study the relation between the manganese content in the steel from the first and last ladle test. The average manganese content of the first test is 0.3262 pct Mn compared with 0.3035 pct in the last ladle test, or a difference between averages of 0.0227 pct Mn. The correlation between the two samples is 0.863. Using this value we can compute a formula for estimating the last test if the first test is known, the formula being:

$$\text{Last test pct Mn} = 1.064 \times (\text{1st test}) - 0.44$$

The correlation of the two manganese tests is extremely high as compared to the values shown in table III because it is evident that the manganese in the first test almost totally governs the amount of manganese which will be found in the second test, the only factors causing a discrepancy are those shown in the table which have correlation coefficients higher than 0.174.

Casual inspection of table III reveals that five sets of factors have relations over 0.174. These relations have been italicized. The other factors have very low correlation so that there is a clear demarcation between factors which affect each other and factors which do not.

By using the values given in the table several factors can be immediately eliminated since they have no relation to any of the others in causing reactions. Thus the carbon content of the steel shows no effect on any of the other factors related to the problem. Mold number at which the reaction occurs is related only to the amount of silicon added.

TABLE III

Summary of Practice of Reacted Heats

Values are First Order Correlation Coefficients

		FeO Pct X_2	C Pct X_3	Wt Si Lb X_4	Mold No. X_5	Final-Prel. Mn, Pct Mn X_6	Mn Drop Pct Mn X_1
	Average	19.4	0.0914	26.15	9.18	0.205	0.024
	σ or Standard Deviation	4.48	0.0146	6.85	4.92	0.0717	0.0187
FeO	X_2	—	−0.044	0.062	0.054	*0.175*	*0.223*
C	X_3	—	—	−0.055	−0.096	−0.014	0.015
Weight Si	X_4	—	—	—	*−0.301*	0.091	*0.184*
Mold No.	X_5	—	—	—	—	0.032	0.021
Final-Prel. Mn	X_6	—	—	—	—	—	*0.231*
Mn Drop	X_1	—	—	—	—	—	—

TABLE IV

Correlation Values of Factors Showing a High Degree of Relation (Regression equation is calculated from these values)

	Weight Si	Final-Prel.	Mn Drop
FeO	0.062	0.175	0.223
Weight of Si	.....	0.091	0.184
Final minus prel. Mn	.....	.....	0.231

Both of these factors describe the reaction and it is therefore natural that the time of reaction should be related to the violence of reaction. However, since the mold number appears to have low correlation to factors affecting the degree of reactions, it can be eliminated and a condensation results in table IV, where only factors of high correlation were listed.

A general view of the factors listed in table IV and their variation is afforded by the frequency charts of fig. 1. These diagrams together with the averages and standard deviations give a clear picture of the scope of the data used in this study.

The problem now becomes one of determining to

TABLE V

Two Methods of Expressing Influence of Practice on Ladle Reaction

Points of Mn Lost by Reaction (Y)	FeO (X_1)	Weight of Ferrosilicon Required to Stop Reaction (X_2)	Difference Between Final Mn and Prel. Mn
Correlation of Y with the X's (r_y)	0.223	0.184	0.231
Standard Regression of Y on the X's (betas)	0.181	0.156	0.185

what extent each of the factors listed in table IV affect the ladle reaction. It appears from table IV that the increase in manganese content of the steel from the ladle addition (final minus preliminary manganese) and the manganese drop from first to last ladle test might both be the effect of the slag oxidation as measured by FeO. This relation makes it appear possible that the final minus preliminary manganese is the chief cause of the manganese drop and the correlation between the manganese drop and the FeO are simply coincidental. It is possible therefore to work with only one value, the final minus

TABLE VI

Conditions Favorable to No Loss of Manganese (Estimated from Equations 2 and 3)

Final minus Prel. Pct Mn	FeO Estimated from Equation 3	FeO	Final minus Prel. Mn Estimated from Equation 2
0.05	16.7	10	0.178
0.10	17.1	20	0.193
0.20	17.9	30	0.219
0.30	18.7	...	.....

preliminary manganese, if one is certain that the manganese drop is a function of this value. The weight of silicon added seems to be truly independent of the other two values. To test this hypothesis it is necessary to determine the actual, or true and independent relation of each factor to each of the other factors.

Since each factor has some effect on all the others it is necessary first to devise some method of mathematically minimizing this intercorrelation. This can be done by calculating the standard regression or beta coefficient of each factor as has been done in table V.

An inspection of table V shows that, no matter what method of expressing degree of relation is used, the extent of the ladle reaction as measured by the manganese drop is affected most by the difference between final and preliminary manganese, next by the FeO content of the slag, and least by the violence of the reaction which is measured by the amount of silicon necessary to stop the reaction.

Should it be deemed necessary to estimate roughly the extent of reaction in terms of manganese drop, it can be done by using the difference between final and preliminary manganese. If two factors were used to make a closer estimate, the FeO would be used as the additional factor. However, if the closest estimate were desired, all three factors should be used in the form of a multiple regression equation which is calculated to be—

$$\text{Estimated Mn Drop} = 0.000755\ X_1 + 0.000426\ X_2 + 0.0483\ X_3 - 0.0117$$

in which X_1 is the pct FeO in the slag, X_2 is the ferrosilicon, in pounds, added to stop the reaction and X_3 is the difference between final and preliminary manganese.

Since this is an equation in three unknowns it is difficult to chart, but figs. 2 and 3 were constructed as an illustration of how it may be used. In fig. 2, the FeO was held constant at 19.4 pct. For each change in the amount of ferrosilicon required to stop the reaction there is a separate line on which the manganese drop will vary proportionately with the amount of ferromanganese added at tap as measured by the rise in manganese from the preliminary to final analysis.

In fig. 3 the silicon was held constant at the amount which was added to most of the reacted heats (20 lb). For each change in the FeO content of the slag there is a separate line on which the manganese drop varies proportionately with the final minus preliminary manganese analysis.

The metallurgical interpretation of these relations can be summed up as follows: At the end of the heat there is a fair degree of stability in the relations among the oxidation of the slag, the MnO, the residual manganese, and possibly other factors. Whether or not this condition represents chemical equilibrium is largely an academic question. This term is so often used loosely that it is thought best to avoid it unless there is evidence that there is equilibrium.

When the heat is tapped, there is a sudden drop in temperature and, due to the ladle addition, an increase in the manganese content of the metal with practically no change in the composition of the slag. Thus tapping puts the slag that was in balance, or approximately so, with the residual manganese in contact with metal of much higher manganese con-

tent. The tendency, of course, is for the slag to oxidize the metal. Such reaction is opposed by chilling the slag for solid slag is inert. The extent of this oxidation tendency is measured roughly by the points of manganese recovered from the ladle addition and is represented by the variable of ladle manganese minus preliminary manganese.

The effect of FeO is twofold. Higher FeO will favor a lower residual which means that for a given specification these heats will require a larger manganese addition. Also, the higher FeO will have a greater tendency to oxidize the metal in the ladle.

Some attention to the definition of terms is required in order to understand the influence of silicon. The heats selected for study are those that had enough reaction to require the steel pourer to add silicon. The amount added was what was judged necessary to stop the reaction. Thus it is rather easy to understand that the heats with a violent reaction have a large addition of silicon. If 30 lb were added to a heat that required 15 lb, the association of a greater drop with the larger silicon addition would not be expected to hold.

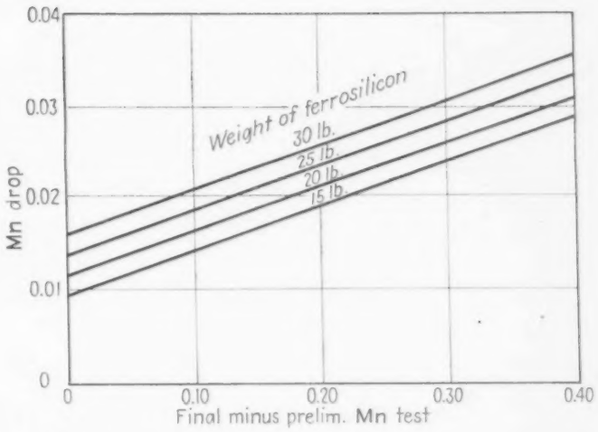
Heat size and amount of skull are related to the time during pouring when the reaction occurs. Their influence on the extent of the reaction is obscure.

The question now arises, "What use can be made of this information to define conditions that may prevent ladle reactions?" The indication given by the amount of silicon added to the ladle can be used to add accuracy to the estimate of the extent of the reaction, but is of little value in defining conditions that would tend to prevent or to minimize the extent of reaction. In this case the reaction is the cause of the silicon addition rather than the result. That the correlation is fairly low (0.184) is believed to be due in part to errors in judgment in estimating the amount required, and in part to an imperfect relation between violence of the disturbance and elimination of manganese. The conditions most favorable to a low drop in manganese are those prompting the addition of 15 lb of ferrosilicon, therefore this value is selected as the first step in defining conditions for no loss of manganese. At this point there is perhaps the temptation to substitute the value zero for the manganese drop in the left member of equation 1 and the value 15 lb for X_2 of this equation and determine a functional relation between FeO and points of manganese recovered from the ladle addition. This procedure is unsatisfactory for two reasons. In the first place, it yields some absurd values, which is not particularly surprising, because in the second place it is mathematically unsound. Equation 1 is a regression equation and cannot be treated as a functional relation.

In a problem in two variables, the idea of two regression lines is fairly well accepted without confusion as to which is cause and which is effect. Similarly there is no assumption as to cause or effect in stating a multiple regression relation with first one and then others of the factors as the dependent variable.

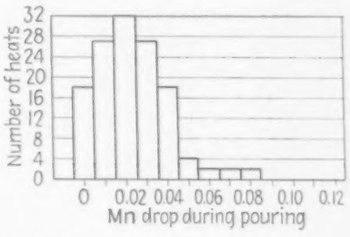
When final minus preliminary Mn is the dependent variable, the regression equation is:

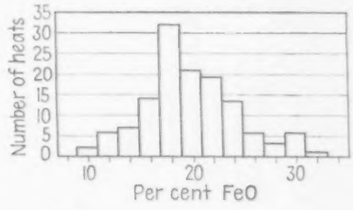
(2) Final preliminary = 0.134 + 0.00206 (FeO) + 0.0005 (Si) + 0.742 (Mn drop)



ABOVE

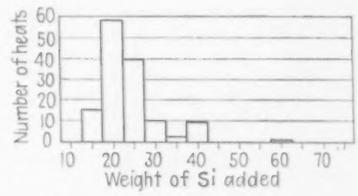
FIG. 2—Estimated manganese drop with FeO held constant at 19.4 pct. Estimated drop = 0.000426 Si + 0.0483 (final minus prelim. Mn) + 0.00295.





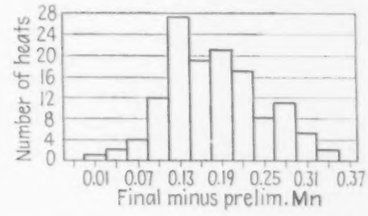
RIGHT

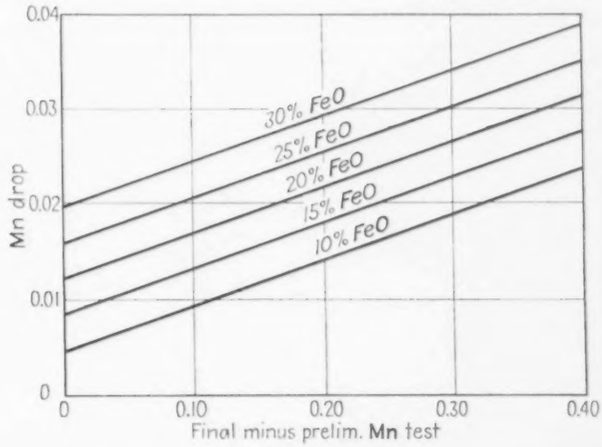
FIG. 1 — Distribution of heats studied, charted by various factors, indicate scope of data used in this article.



BELOW

FIG. 3 — Relationship of manganese drop to final minus preliminary manganese with silicon held constant at 20 lb. Estimated drop = 0.000755 FeO + 0.0483 (final minus prelim. Mn) — 0.00318.





When FeO is the dependent variable, the equation is:

(3) FeO = 16.4 + 0.010 (Si) + 8.1 (final-prelim. Mn) + 45.5 (Mn drop)

Substituting the value 15 for the weight of silicon because this addition is associated with a low drop, and zero for the manganese drop in equations 2 and 3 gives the values shown in table VI.

An interpretation of table VI is that these values represent the best average values considering all points. If all heats with 10 pct FeO were grouped, the average of the difference between preliminary and final manganese would be 0.178. Likewise, the values given for 20 and 30 pct FeO are the average values that a group of heats with no manganese drop and 15 lb of silicon would be expected to have.

The values obtained from equation 2 (above) are based on a slightly different grouping. This equation considers that the grouping is made on the basis of the difference between final and preliminary manganese. If heats are selected with this difference having a value of 0.05 pct Mn, the average FeO is 16.7 pct. The other values of table VI are to be considered as average values for groups with 10, 20 and 30 points difference between preliminary and final manganese.

The two parts of table VI do not give identical values because of the imperfect correlation between the two. The two lines are given so that whichever is of greatest interest can be used.

One overall statement seems justified, that is that regardless of the variation of final minus preliminary, the preferred range of FeO is from 16.7 to 18.7 pct and similarly regardless of variation in the FeO over the range 10 to 30 pct the most favorable range for final minus preliminary manganese is 0.18 to 0.22 pct Mn. Working with these two preferred ranges as an aim would be the first step suggested by these data. If still further adjustment seems advisable, the first approach would be on the basis of equation 2.

Many factors affecting a ladle reaction are not considered in this study. This conclusion is supported by knowledge of the process and is also indicated by the rather low value of the coefficient of determination. The relations pointed out are definite enough to give considerable assurance of their effect. This report is offered in the belief that it may stimulate further study of this interesting and at times baffling problem.

Ductility and Elasticity of White and Gray Iron

ALTHOUGH popularly considered brittle materials, white, mottled and gray irons may be manufactured with definite elasticity and ductility as well as reproducible tensile strength and other properties, it was pointed out in the paper entitled "Ductility and Elasticity of White and Gray Irons," by R. A. Flinn and H. J. Chapin, metallurgical department, American Brake Shoe Co., Mahwah, N. J., and presented at the annual meeting of the American Foundrymen's Association, Cleveland, 1946. The authors stated that as the matrix structure is changed from pearlitic to austenitic, the plastic elongation changes from 0.00 to 0.05 pct in white and mottled irons and from 0.05 to 3 pct in gray iron. Ferritic-pearlitic gray irons exhibit up to 1 pct elongation. Modulus of elasticity varies from 26.0 to 10.4×10^6 psi depending upon the structure. Hot tensile tests and concentrated load compression tests also indicate important ductility in certain of the above irons.

Microhardness data were given to provide the individual penetration hardness of the various structural constituents. A survey of established service applications was said to indicate that the elastic and plastic constants cited above may be equally as significant as tensile strength and hardness in determining casting performance.

H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, long associated with malleable iron research, contributed a paper entitled "Chemical Composition of Malleable Iron." This paper discussed at length the effects of various elements in malleable iron on graphitization and mechanical properties on the basis of a thorough survey of technical literature and the author's own researches. The extensive bibliography on alloying malleable appended to this paper is of particular value.

Causes and methods of prevention of bore cracks which are hot tears that occur in the bores of valves and fittings under the flanges, were covered in a paper entitled "Bore Cracks in Cast Steel Fittings and Valve Bodies," by H. F. Taylor, research associate, MIT, and H. F. Bishop and W. H. Johnson, of the Naval Research Laboratory of the Office of Research and Inventions, Washington. The authors of the paper pointed out that these cracks are caused by stresses which result when the ends of a valve or fitting and the comparatively thin barrel contract circumferentially and pinch down on the core, thus restraining linear contraction from taking place. Bleeding tests show that the bore crack occurs after the barrel has solidified, at which time the stresses which linear contraction exceed the strength of the metal skin beneath the flange.

This defect can be eliminated, the authors claimed, by two means: (1) by the ues of a hollow core, which can be deformed by the circumferential contraction of the casting, automatically relieving the stresses and permitting linear contraction to take place, and (2) by the use of graphite collars or properly designed steel chills in the core which chill and strengthen the metal in the casting so that its strength exceeds the imposed stress. The influence of other factors, some of which have a minor effect on the bore crack were also studied. These include gating and risering practice, mold resistance, pouring temperatures, metal composition, and mold atmosphere. Theories of the cause and formation of veins, which are closely allied to the bore crack, were also covered in the paper.

High Temperature Alloys

The Ni-Cr-Co-Fe base cast alloys are important materials for high temperature operations. The effect on high temperature physical properties of various factors, such as (1) aging treatment, (2) carbon, nickel and tantalum, (3) nitrogen, (4) heat treatment and (5) surface condition, are quantitatively considered by the author.

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THE complex Ni-Cr-Co-Fe base alloys have been felt to be aging alloys if treated properly. Certain investigators found that aging may or may not help the room temperature tensile properties of highly alloyed nickel-chromium alloys. To check the alloys, a fairly large number of specimens were tested in both the aged and unaged conditions. Some of the aging was done at the test temperature while several of the treatments were at somewhat higher temperatures. The time of aging ranged from 12 to 200 hr at temperature without load.

Parts one and two of this four-part article, published in the issues of May 23 and 30, considered the preparation of various forging-type alloys and Ni-Cr-Co-Fe base and Vitallium base cast alloys and listed high temperature physical properties of these materials. The Vitallium alloys will be discussed in greater detail in a subsequent issue. The research project covered by this article was conducted for the Navy Dept. under Bureau of Ships research memorandum No. 1-45.

Table XIII tabulates the results of these tests. The tests being compared had the same solution treatment, and were tested at the indicated stresses. The open figures are in hours to fracture while the figures in parentheses are elongation values in percent. All tests were aged for 50 hr unless otherwise noted.

An examination of table XIII indicates that aging prior to testing may or may not help the high temperature strength of either the Ni-Cr-Co-Fe base or Vitallium base alloys. In any event the degree of difference shown between comparable tests is not too far out of line of normal testing errors. Before any particular alloy can be accepted as being in its optimum condition it should be tested in both the aged and unaged conditions; however, for normal test purposes and to conserve on testing time the better materials in either of these systems can be selected on the basis of unaged tests according to these data.

Aging for long periods of time, such as 200 hr at temperatures, is not advisable from the results of two tests; however, more data should be available before a final decision can be made.

Aging at temperatures greater than the test temperature (in these cases, 1500°F) also appears to be inadvisable on the basis of four tests which are limited to the Ni-Cr-Co-Fe base alloys. In this group, however, a much safer margin of comparison is allowed for prediction of results.

It appears that a somewhat higher average ductility may be expected in the unaged tests.

High Temperature Properties

Effect of Carbon, Nickel and Tantalum—Up to this point it had been determined that insofar as high strength at high temperature is concerned, the cast alloys offer a broader working field of composition variables than do the forged alloys. It has further been determined that heat-treated materials are superior to as-cast materials, and that 2250° to 2280°F is the best solution temperature range, with the suggestion that 2250° or 2260°F is the safer temperature due to commercial furnace temperature control variables. Water quenching is the best cooling method. Aging may or may not improve the alloys beyond this point.

Going beyond that, a great many tests were run at stresses ranging from 30,000 psi in rupture to 7000 psi in creep loads at both 1500° and 1600°F to try to find the effect of various alloying additions on the high temperature, high strength properties of the Ni-Cr-Co-Fe base alloys.

TABLE XIII

Effect of Aging Treatments on Rupture Life and Ductility Of Both Ni-Cr-Co-Fe Base and Vitallium Base Alloys

Alloy	Stress, Psi	Not Aged	Aged 1500° F	Aged 1550° F	Aged 1600° F
TE-O	20,000	.....	21.5 (7.9)	12.8 (35.9)	.....
TE-C1	20,000	11.5 (18.4)	18.5 (2.6)	4.3 (19.8)	.....
MT-2	20,000	13.0 (27.6)	11.0 (18.3)	.....	.....
MT-8	20,000	8.0 (16.1)	11.0 (10.5)	.....	.....
MT-9	20,000	30.0 (7.0)	16.0 (7.9)	.....	.....
MT-10	20,000	7.0 (23.6)	8.5 (31.0)	.....	.....
MT-11	20,000	22.0 (24.2)	20.0 (21.4)	.....	.....
MT-12	20,000	24.5 (16.6)	17.0 (30.5)	.....	.....
93N-2	30,000	101.2 (7.1)	22.3 (5.4)*	.....	.....
18TG-1	20,000	62.0 (16.8)	.....	.....	40.0 (14.2)†
15TG-1	20,000	.....	23.3 (15.4)†	10.0 (14.5)†	.....
86N-2	20,000	960.0 (3.6)	828.0 (3.1)*	.....	.....
40VT2-2	30,000	27.4 (8.1)	40.0 (6.5)	.....	.....
91VT2-2	30,000	180.0 (7.9)	174.3 (15.3)	.....	.....

* Aged 200 hr.
† Aged 24 hr.

It has been found in this work that a semilogarithmic plot of hours-to-rupture on a logarithmic scale v. carbon content (and possibly other alloy contents) on a linear scale presents an arrangement of points closely fitting a straight line on the average (these observations are used as a basis of figs. 1 and 2—fig. 2 to appear in a subsequent issue).

Curves were plotted to show the change in rupture life with increasing carbon content for various Ni-Cr-Co-Fe base alloys at 30,000 psi and 1500°F. In the P-2 series carbon has the effect of increasing the rupture life—a maximum is reached just beyond 1.17 pct carbon.

By increasing the 20 pct nickel in P-2 to 30 pct in N-2 the curve is raised and shifted to a lower carbon content for the peak value, but more important, there is a large increase in the ductility of the N-2 alloys. The P-2 series is quite brittle in the high carbon ranges and the elongation values drop to a very low point for the strongest alloys. The increased nickel content improves the ductility quite considerably.

The presence of 2 pct tantalum instead of 1 pct columbium, changing N-2 to the NT-2 series causes the curve to move back to the right a slight amount but does not appear to change the peak rupture life value (at 30.000 psi). There is essentially no difference in the ductility of the N-2 and the NT-2 alloys.

The S-2 and SA-2 series are the cast S-497 and cast S-497 with 20 pct chromium instead of 15 pct respectively. The 15 pct chromium alloys (S-2) appear to be stronger and more ductile. The rate of strength increase with increasing carbon is less for either of these two series than for the others.

Fig. 1 shows the results of rupture tests at 20,000 psi and 1500°F for various Ni-Cr-Co-Fe base alloys. While the curves show the same trends with increasing carbon as for tests conducted at 30,000 psi, there is one very important change to be noted.

Whereas at 30,000 psi the NT-2 values were somewhat lower than the N-2 values up to the maximum carbon, at 20,000 the order is reversed by an even larger margin. That means that as lower and lower stresses are encountered—approaching creep stresses—the NT-2 alloys should show a corresponding improvement in life over the N-2 alloys.

The effect of carbon on the minimum creep rate of various Ni-Cr-Co-Fe base alloys also is worth noting, in that the NT-2 alloys appear superior to the N-2 alloys, again indicating better creep performance.

The M-1 series points were not included in the plots because of the extremely wide difference in test results for similar tests. It appears that the maximum solution temperature is too close to the recrystallization temperature, making it very difficult to heat treat the alloys for optimum performance.

Rupture test results for a majority of the best alloys for all the various combinations in the Ni-Cr-Co-Fe base system show the best performing alloys to be 99NT-2, 109N-1B and 111N-2.

The best values obtained in creep were with alloys 121N-1B, 104NT-2 and 108N-2. Considering that alloy 104NT-2 is not the best NT-2 alloy and is far exceeded in rupture values by 99NT-2, it is safe to assume that alloy 99NT-2 would give us just about the best creep results of all the Ni-Cr-Co-Fe base alloys. This figure would be expected to be better than 0.00001 pct per hr at 15,000 psi and 1500°F.

Alloy 111VT2-2, the best Vitallium base alloy to date (with tantalum added) was compared with the better NT-2 and N-1B alloys. The rupture results on alloy 111VT2-2 indicated that it would not show as good a creep rate under similar conditions, and this was verified by the creep test. However, the fact that alloy 111VT2-2 shows greater ductility for similar test conditions may mean that it would last as long in creep but with a greater final elongation. This is a reasonable hypothesis in view of the lack of data for extra long time creep tests.

Ni-Cr-Co-Fe Base Alloys

Effect of Nitrogen—When this program was first started, the aim was to study low carbon (maximum 0.15 pct) forging grades of alloys which were to have up to 0.15 pct N_2 added to them. These alloys were of the Ni-Cr-Co-Fe base composition. In only one of these compositions was there greater than 0.15 pct carbon. This alloy was SY, calling for 0.20 to 0.25 pct carbon. Alloys TA, TB, TC, TD, TE, TF, TG, SX and SZ were all found to produce completely sound ingots free of any blowholes. Alloy SY, however, was made three different times and each time the ingot tops puffed and blowholes resulted throughout the ingot body. The alloy was not forgeable. Very recently two of the N-155 type alloys were cast under the same conditions as were the above heats. Alloy 25NT-2 with no nitrogen added was cast into sound, forgeable ingots while alloy 25N-1B with 0.15 pct N_2 added produced an ingot full of blowholes.

Vacuum fusion analyses showed that in heats with less than 0.15 pct carbon where 0.15 pct nitrogen was added, 0.15 ± 0.02 pct of nitrogen was found by analysis. This indicates that for the amounts of carbon and nitrogen used, both were soluble to at least that extent within the alloys. Where the carbon was 0.20 pct or greater, there resulted a rather wild gas evolution—presumably nitrogen as N_2. This indicated that with 0.20 or 0.25 pct carbon, less than 0.15 pct nitrogen was soluble in the alloy, depending on the quantity of nitride and carbide forming elements present in the alloy.

After the casting program replaced the forging work, nitrogen was again tried as an alloying element. Preliminary results indicated some benefit. The practice was to call those alloys, which had no nitrogen added, the N-2 or NT-2 alloys. When nitrogen was added, the figure 1 replaced the 2 and the letter following designated the amount of nitrogen added. Thus 1B indicated 0.15 pct N_2 added, 1C indicated 0.20 pct and 1D indicated that 0.23 pct N_2 was added (the maximum for a 20 pct chromium alloy when adding nitrogen as nitrogen-bearing ferrochromium).

The fact that a vigorous boil accompanied the addition of the nitrogen-bearing ferrochromium was not considered harmful because radiographs showed the bars to be sound and there were no nitrogen analyses to indicate that anything unusual had happened. Several months ago, however, it was noted that some heats showed a badly puffed hot top on the casting assembly. It was about this time that results on the nitrogen-bearing alloys suddenly showed very erratic test results in the same heats or in similar heats. Radiographs indicated these test bars to be sound, however.

It was decided to analyze a large number of the heats made to see what the actual nitrogen analyses might show. Heats to which no nitrogen had been added were also checked to obtain a basis of comparison. Oxygen analyses are indicated, in general, very regularly between 0.004 and 0.008 pct. All values were rechecked at least once and some were rechecked

as often as three times to get good final agreement for all alloys.

It was found that when no nitrogen is added to the alloys, they naturally maintain 0.061 to 0.062 pct on the average due to the presence of the high chromium content. However, whether 0.08, 0.15, 0.020 or 0.23 pct nitrogen is added, these alloys at best can maintain only about 0.091 to 0.099 pct total nitrogen. Any amount of nitrogen added in excess of about 0.03 pct, therefore, is released to the atmosphere due to the lack of solubility of these high carbon alloys for nitrogen in excess of about 0.09 odd pct. It is recalled here that even the 0.25 pct carbon forging alloys were forced to release much of the nitrogen when 0.015 pct additional nitrogen was added to the molten bath.

Therefore it now seems evident that when heats were cast which resulted in puffed hot tops, and when certain of the nitrogen-bearing heats showed very poor test results, the heats were being cast too soon, that is before all the nitrogen in excess of the solubility value had boiled off. As a result, in cast ingots a blowhole condition resulted while in the precision cast test bars some general porosity must have been prevalent which, while giving considerably poorer rupture test results, was not noticeable in radiographic examination.

Three of the most severely puffed heats show a generally higher nitrogen content than the averages of the other better performing heats. Where the three badly puffed heats show an average nitrogen content of 0.118 pct the average of the other heats is closer to 0.090, a very large difference. This, it is believed, verifies the statement that the alloys were cast while still in the process of releasing excess nitrogen. Among high nitrogen-bearing heats other than the severely puffed ones then, it might be expected that all degrees of lack of nitrogen equilibrium were present, and this naturally would cause a considerably greater spread in stress rupture values of both intra and interheat tests. The results would, therefore, not be as uniform as they are in the P-2, N-2 and NT-2 series of alloys.

It was evident that for carbon contents less than the peak value of the series no benefit was derived from the nitrogen addition, but for carbon contents greater than the peak value, a nitrogen increase improves the rupture strength. This same effect occurs in both the N-2 and NT-2 series but appears more effective in the N-2 group. Actually, however, there is only a shift in the maximum optimum carbon value in the NT-2 system with very little change in the maximum attainable strength, so that the strength benefits due to a nitrogen addition are not real here. A worthwhile increase in strength in the N-2 system was, however, attained by increasing the nitrogen. This increase in strength appears even more worthwhile as creep stresses are approached, as evidenced by the very good performance of alloys 109N-1B at 20,000 psi and alloy 121N-1B at 15,000 psi in creep.

With regard to the effect of the nitrogen content on the ductility of these alloys (for tests at 30,000 psi and 1500°F), it was found that the ductility is increased by almost 1 pct in the NT-2 series and by about 0.5 pct in the N-2 series.

The recommended melting practice, henceforth, is to add the nitrogen-bearing ferrochromium soon enough in the charge to permit the excess nitrogen to boil off, or to add only 0.04 pct which, in addition to the normal pickup of 0.06 pct, should raise the nitrogen content to the desired maximum. The first of these suggestions was tried with alloy 101NT-1B recently. The rupture test results fell just about where they were expected to for the several tests tried, indicating that the cure for the troubles had been found.

NT-2 Alloys

Effect of Heat Treatment—On the basis of the large differences shown in rupture life and ductility by the same alloy in the as-cast and heat treated states, it was felt that a more completed heat treatment study should be made.

The NT-2 system was chosen since it not only showed the very best rupture and creep results but also gave the most reproducible alloys and tests. Four additional NT-2 alloys were cast ranging from 0.99 to 0.93 pct

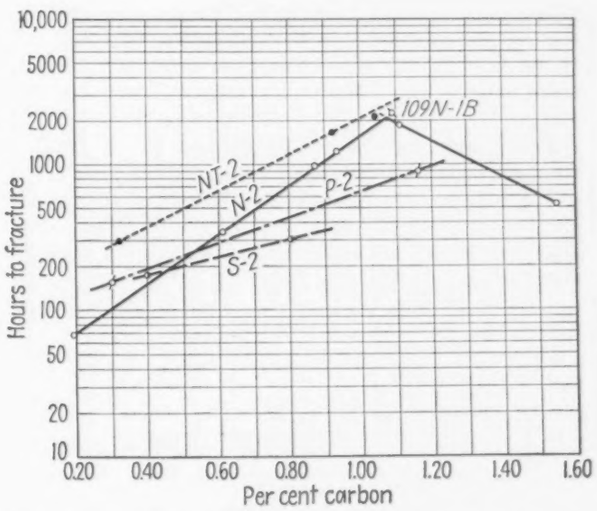


Fig. 1—Per cent carbon v. rupture life at 20,000 psi and 1500°F.

carbon. After preliminary tests proved that these alloys agreed closely with data already on hand, heat treatments of various types were conducted. A change in rupture life with a change in heat treatment was noted, with test values at 1500°F for both 30,000 and 25,000 psi tests. There is a distinct loss in strength as the solution temperature is lowered, this being equally true and on the same scale, relatively, at 30,000 or 25,000 psi.

Also, as regards the change in ductility with a change in solution temperature, a point worth noting is that in going from 2260° to 2200° F, there is a greater loss of strength than there is a gain in ductility. In going from a solution temperature of 2260° to 2100° F the following changes may be expected: (1) a 74 pct increase in ductility, and (2) a 63 pct decrease in strength. As has been frequently postulated, these values strongly verify the statement that in any one limited alloy system or in any one particular alloy, the ductility and strength are inverse properties.

Effect of Surface Condition—Precision casting when properly carried out is meant to give surfaces requiring only a sandblasting finish to remove adhering sand and light scale. If and when cold shuts, surface oxide skin wrinkles and tiny fins occur, sandblasting does not remove them. Many of these wrinkles and fins are fine enough so that they are not considered harmful. Occasionally tiny pits are present on the surface of the test bars.

To determine the role and extent of the surface

finish a number of alloys were selected which offered good prior test data. The surfaces of these bars were polished by first polishing with 100 grit emery cloth and finishing with 320 grit cloth. All circumferential marks were polished out but tiny pits were allowed to remain in the surface. Any longitudinal wrinkles, scratches, etc., were left in the surface.

The tests were run at 30,000 psi and 1500°F. In all cases the heat treatment was 2250° to 2260°F, followed by a water quench. None was aged prior to testing. In the SA-2 series, which shows very low fracture life, polishing shows no improvement. The extremely short life of these specimens, however, makes them difficult to judge. With the exception of 124NT-1B all the tests show improvement due to the polishing, the improvements ranging from 20 to over 60 pct.

Tiny pinpoint holes in the specimens do not appear to be harmful in the small numbers found present since none of the failures occurred at the site of the pits.

The improvement in rupture life that will be attained through polishing depends on several variables:

(1) Casting Technique—the smoother the as-cast surface of the test bar and the freer it is from cold shuts, wrinkles, fins, etc., the less will be the improvement through polishing. First, the wax surface must be perfect; second, the spray or dip coating must reproduce the wax finish; and third, the mold must not crack or frit during firing and handling.

(2) Melting Practice—melting must be done with the view in mind of pouring a slag-free, oxide-free melt when possible. Any slag, but especially any oxide skin, such as titanium oxide, will present the possibility of getting either entrapped slag at the surface or skin wrinkles. Both the mold and metal temperature must be sufficiently high to prevent cold shuts.

(3) Molten Metal Characteristics—certain alloying elements and certain alloys oxidize quite readily and form a tough continuous skin over the metal surface. These skins persist even under an essentially carbon monoxide atmosphere. In pouring such melts the tendency to get oxide skin wrinkles is fairly great. This is especially true of titanium-bearing heats but also of aluminum and zirconium.

It has been found too that the molten high carbon Vitallium heats are much cleaner than the Ni-Cr-Co-Fe base alloys and sandblast much more easily also.

Thus certain test specimens depending on their previous history will show fairly poor values compared to those which are highly polished. These imperfections acting as stress raisers are much worse at high test loads such as 30,000 psi, and in the less ductile alloys.

Hand Tool for Sheet Metal Crimping

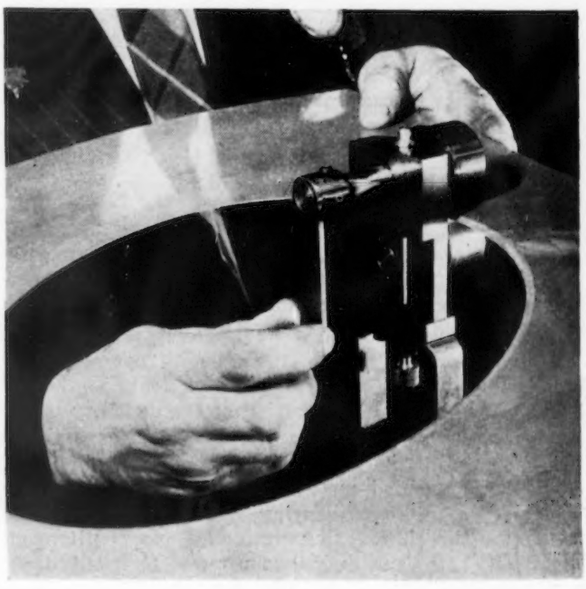
SHEET metal up to 16 gage may be crimped either at the bench or after installation by means of a device shown in the accompanying illustration recently perfected by tool engineers at the Glenn L. Martin, Baltimore plant. The tool is said to work equally well on straight edged metal, sheets or pieces curved to any shape, on the inside of blanked-out holes or wherever crimping on sheet metal may be required.

In its general shape, it is not unlike the familiar can opener attached to the kitchen wall or a tool used by shoemakers to crimp pieces of leather together. Two round dies, one with a projecting edge, the other rounded to fit, are held together by spring tension and an adjustable screw to fit them for various thicknesses of metal.

Turning a crank pulls the metal sheet between the dies. Held firmly against a guide, the edge of the metal is crimped to the desired shape. Little physical strength is required for the operation, no more than to open a can of food in the kitchen, and the time saved is at least half as compared with any other hand tool which would perform the same job.

The tool may be operated by clamping it in a bench vise, probably its most widely used place. By substituting a wheel for the conventional handle (with little sacrifice in leverage) it also can be used right on the piece needing crimping after it has been installed in the airplane, or a new crimp can be put into a piece of sheet metal without having to completely remove it from the ship.

Rachet wheels may be installed in the device so that there is no slipping, for being small and handling only the thinner sheets of metal, the gears will not unmesh sufficiently to become separated.

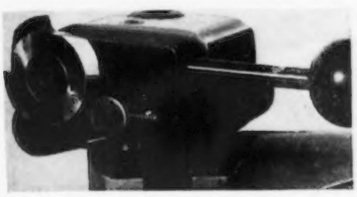


New Equipment . . .

Small Tools

A review of recent developments in small tools and miscellaneous shop equipment is presented herewith. New products covered in this digest include thread forming attachments, drill sharpeners, face mills, die accessories, live centers, electronic counters, shop inspection and measurement devices and various small machine tool control mechanisms.

A FOUR-TOOTH formed threading tool arrangement for chasing external threads has been added to the line of standard tool holders available for the Retract-A-Tool, produced by the *Foulk Engineering Co.*, 4208 Airport Rd., Cincinnati 26. The illustration shows the



formed threading tool mounted on a No. 1 size Retract-A-Tool. These replaceable tools, obtainable in five standard sizes, can be sharpened off hand on any tool grinder and readjusted to the proper center height by means of a stake adjusting screw. Accurate thread form not obtainable by off hand grinding of a single point tool is said to be produced with this new arrangement. The Retract-A-Tool automatically snaps the tool away from the work at the end of each threading cut at precisely the same point, allowing, it is said, increased spindle speeds without danger of the tool digging into the work at the thread ending.

Box Jigs

BOX jigs, available in 150 different sizes, square and rectangular shapes, have been announced by the *Chicago Drillet Corp.*, 928 S. Michigan Ave., Chicago 5. These units are said to accommodate all variations and ranges of shapes and sizes up to 6-in. capacity. Removable sides together with a thumbscrew and leaf arrangement make it possible to use the jig on its six sides. All parts of the jig are independent and can be worked on separately when mounting locators and clamps, or boring holes for drill bushings.

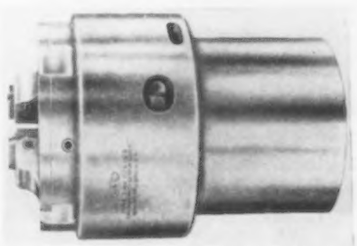
Drill Sharpener

FOR sharpening shop drills, a sharpener has been designed by *Majestic Drill Sharpener Co.*, 1100 2nd Ave., S., Minneapolis 2. By turning a calibrated dial, the sharpener is automatically set so that both cutting edges and both angles will be ground alike. The tool takes any size drill from 5/32 in. to 1 in. with either straight or No. 2 taper shank, and can be ad-

justed to sharpen drills for use in either hard or soft materials. The sharpener fits any grinder.

Die Heads

A SOLID adjustable insert chaser die head for Goss & DeLeeuw double threading chucking machines, known as style SMM, size 103, has been developed by the *Eastern Machine Screw Corp.*, Truman and Barclay St., New Haven 6, Conn. The head has a normal thread range up to 1¼-in. diam, 3 in. long. The shank fits over the spindle of the machine, thus permitting tapping while

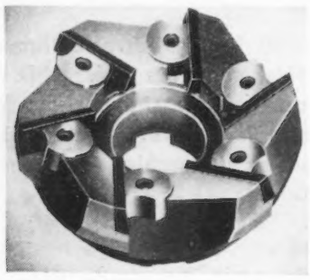


threading. This design results, it is said, in a minimum amount of overhang. Style SAM is a simple solid adjustable head using insert chasers and designed with a shank that fits over the spindle of the same threading machine, so that tapping can be done at the same time. This head is lightweight with a minimum overhang. An insert chaser die head, style DMT, for use on Brown & Sharpe automatics for cutting taper pipe threads, has also been designed by the company. This head opens gradually to form the taper and is said to eliminate the marks along the thread that are usually present on a jam cut taper thread.

Face Mill

THE solid carbide blade face mill offered by the *Beaver Tool & Engineering Corp.*, 2850 Rochester Rd., Royal Oak, Mich., has the advantage of removable blades that can be changed by releasing the locking wedges and can be reset by use of a dial indicator. Although

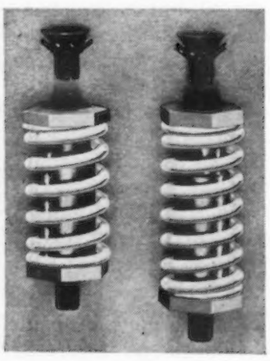
the mill is provided with a fixed radial rake of 15°, the blade can be sharpened to provide any effective rake angle within the normal range. Blades may be ground on a surface grinder, and by using different grades of carbide, all ma-



terials can be machined with one cutter. Deep pockets are provided for chip control, and wedges have curved chip bearing surfaces. A grinding block is provided for sharpening the blades.

Pressure Springs

FOR use wherever spring pressures are required in a die, for stripping work and scrap, or for returning cam slides, an improved line of Strippits has been produced by *Wales-Strippit Corp.*, 345 Payne Ave., North Tonawanda, N. Y. Each Strippit is a spring, held compressed by means of a retainer which is telescopic, nonrevolving and selfcontained. One end has a projection with a screw thread for holding the Strippit to the punch die or die shoe casting and the other end has a tapped hole to accommodate the stripper screw which holds the plate to the Strippit. All Strippits of the same length



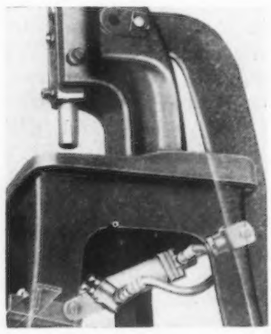
have uniform pressure, assuring, it is claimed, even action over the entire plate. Strippits are packed with lubricant for life, are available in 2, 2½, and 3-in. lengths and may be used in combinations to provide lengths up to 6 in. Initial loads range from 140 lb on the 3-in. Strippit to 175 lb on the 2-in. unit.

Drill Bits

USED by machine shops for drilling chilled iron, and for cored holes in aluminum, cast iron, and other nonferrous materials, carbide tipped Cyclone drill bits have been added to the tool line of the *New England Carbide Tool Co.*, 60 Brookline St., Cambridge, Mass. These drills are used in an ordinary rotary electric drill, thus eliminating hammering. They are made in stock sizes ranging from 3/16 to 1½-in. diam, in steps of 1/16 in.

Pneumatic Operating Equipment

A PACKAGED pneumatic equipment unit, Kit DC-39950, has been designed by *National Pneu-*



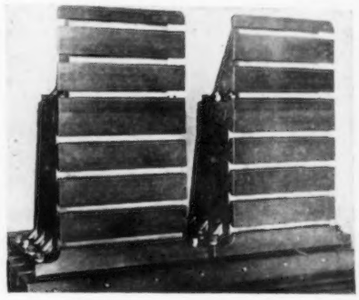
matic Co., 420 Lexington Ave., New York 17, for converting any kick press to power operation. The unit consists of an air engine of 270-lb rated power, delivered at 100-lb air pressure, a foot-operated control valve, or two hand-operated control valves, a speed adjusting fitting to control the engine stroke, cut-off cock for shutting off air to the unit, and an air strainer. Use of this power unit is said to increase press production and improve quality of work.

Collets and Fingers

A BROWN & SHARPE series has been added to the line of Precision collets and feed fingers, produced by the *General Die & Stamping Co.*, 262-272 Mott St., New York 12. Manufactured from a specially developed tool steel, No. 00 and No. 10 collets and fingers are available in all round sizes in 1/64-in. steps. The collets also fit Micro-chuck and Redmer air chuck attachments.

Matched Angle Blocks

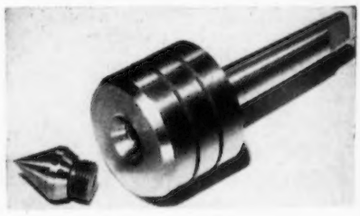
FOR locating and chucking work in boring, milling, planing operations, and for toolroom uses, a



combination of matched angle blocks has been announced by the *DeVlieg Machine Co.*, 450 Fair Ave., Ferndale 20, Mich. Machined from box section castings with T slots and flat surfaces in precise alignment, these matched units may be used singly or in combinations suitable for large and small work. Each set includes T slot nuts, studs and screws ready for immediate application.

Live Centers

EQUIPPED with interchangeable points and tapered seat for precision alignment, the Empire live center has been designed by *Royal Products*, 68 Spring St., New York. Maintained accuracy of ± 0.0001 and efficient lubrication is guaranteed. One live center with six standard points is available in five sizes and specials. A specially made live center fitted with a Jacobs chuck has also been designed by the company, for precision ma-



chining of small-diameter work, and eliminates, it is said, the tendency of the work to buckle in the middle under the thrust action of the center.

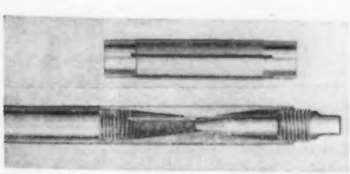
Impact Hammer

AN air power unit, known as the impact hammer, has been announced by the *Mead Specialties Co.*, 4114 N. Knox Ave., Chicago 41.

This small machine, weighing 27 lb, is said to perform many operations, including multiple piercing operations on large metal sheets, either before or after forming. The narrow overall width of the machine permits punching holes as close together as 1¾ in. on centers, with no specific limit to the size of the sheet or number of holes that can be pierced in one operation. For punching operations it is normally used in conjunction with standard punching units. The capacity on 100 psi is ⅜-in. hole in 0.065-in. cold-rolled steel. The value of the impact can be adjusted from the maximum of 4000 lb pressure down to a minimum of a few ounces, it is said. The cycle of the ram is automatic.

Adjustable Lap

CALLED Flexolap and designed specially for tool and die work, a lap has been developed by the *Flexolap Mfg. Co.*, 2156 W. Fulton St., Chicago 12. This tool is adjustable, with an expanding feature to provide for quick, easy takeup to maintain size and compensate for wear on the lapping barrel. Two types of finish may be obtained from the same barrel; slots are



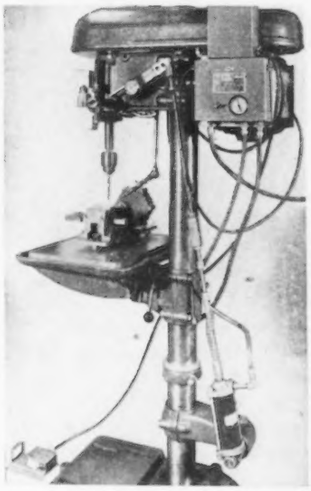
milled off center and when turned in one direction the result is a fast cutting action; when the barrel is reversed end for end, a smooth high polish results. Laps with hard or soft barrels are available.

Resilient Bushing

VIBRATION dampener bushings have been made by the *Manhattan Rubber Div.* of *Raybestos Manhattan, Inc.*, Passaic, N. J., for use with Manhattan wheels for portable grinders. This resilient mounting is said to afford elimination of vibration, better finish, less fatigue to the operator, and to give increased production and lower maintenance cost. Wheels with these mountings are manufactured in straight types up to 8-in. diam, for use on electric, pneumatic and flexible shaft portable grinders.

Air Control Unit

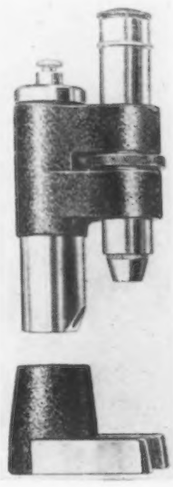
A LOW voltage Electro-Air control which permits conversion of standard machine tools and fixtures to automatic or semiautomatic production units by pneumatic control of machine or fixing movement



has been announced by the *Electro-Air Devices Co.*, 2811 W. Fletcher St., Chicago 18. The control may be used with any standard air cylinder and can be furnished to provide either single or multiple cycle control with the addition of cycle timing, hesitation limit switches, etc., to perform a variety of operations such as tapping, milling, indexing. The unit is compact in design, has no close-fitting parts or valves, and is said to be easy and quick to install.

Shop Microscope

SHOP microscopes designed to permit accurate measurement of surface finishes and damages, to 0.001 in., and estimated measurements to ± 0.0002 in. accuracy, have been announced by *Polan Industries*, Huntington 19, W. Va.



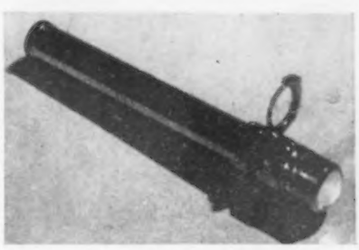
The instrument may be equipped with reticles having special designs for contour inspections or measurement of specific tolerances on tools or parts. It is equipped with a separate removable base, and parallel sides with ground surfaces which make it possible to use the instrument with gage blocks and measuring wires.

Marking Unit

A SAFETY utility marking outfit has been developed by the *M. E. Cunningham Co.*, 101 Carson St., Pittsburgh 19, and is especially adapted to stamping of brand names, lot numbers and serial numbers on etched plates, keys, tools, machine parts and for stamping stock numbers on metal bars and sheets. The utility holder is available in nine sizes with type recesses ranging from ½ to 1½ in. in length. The nine sizes of type characters can be used in any size holder; fractional characters are available with each size of type. The unit has wedge grip features, assuring the operator a firm grip.

Magnifying Flashlight

DESIGNED for close inspection in shop and factory, a flashlight, known as Jr. Surgeons X-L-Lyte, has been announced by



Universal Products Corp., Norristown, Pa. A glass cut-out acts as a switch, insulating and preventing contact when not in use. When the

switch is open, an X10 diopter lens concentrates the focus, magnifying the object under inspection. A silver plated reflector intensifies the light. Both ends of the tube are open, facilitating the removal of the batteries.

Snap Gage

TO magnify dimensional variations mechanically, a visual snap gage, model 1340, has been

designed by *Federal Products Corp.*, 1144 Eddy St., Providence 1. It is a single purpose type gage, with the dial graduated in 0.0001 in., a range of 0.0008 in., and it can be made to suit any dimension between ⅛ in. and 1½ in. The instrument, which weighs 7 oz., has an insulated finger grip and fits the hand comfortably.

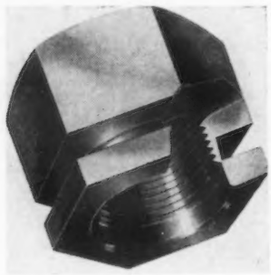
Electronic Counter

DESIGNED to count objects of small size or light weight, the Shadowcount has been produced by the *Autotron Co.*, Danville, Ill. The

device combines the use of a photoelectronic circuit with an optical system in which a short light beam is sharply focused through an aperture in a steel tube or guide, the focal point of the beam falling in the exact center of the tube. Objects being counted break the beam as they are fed through the open end of the tube. The tube is placed in a perpendicular position permitting pieces being counted to fall through by force of gravity. Objects ranging in size from 1/32 to 3⅞ in. cross sectional dimension can be counted, with maximum counting speed for the unit rated at 1000 per min.

Lock Nut

A ONE piece metal lock nut with core grip action, called the Klincher lock nut, has been announced by the *Faultless Caster Corp.*, Evansville, Ind. This nut is said to be free from starting torque, easily applied with fingers to locking position, and can be tightened with standard socket and end wrenches. This fastener comes



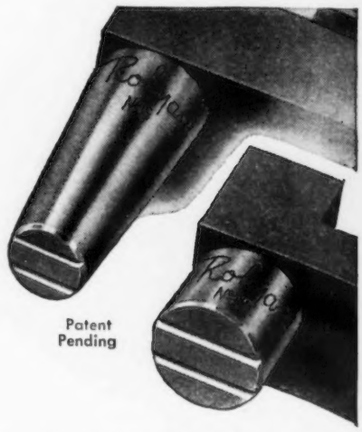
in both steel and brass, national coarse and fine thread series in a full range of sizes. It can be plated and painted and is not affected by high or low temperature applications.

Riveting Hammers

PNEUMATIC riveting hammers featuring small size, light weight and rugged construction have been announced by the *Ideal Commutator Dresser Co.*, 1925 Park Ave., Sycamore, Ill. This hammer, known as the Air-Horse, is said to have perfect balance, ease of operation, and trigger action, and is available in either offset or grip handle for light, medium or heavy riveting. The expansion of air which is exhausted from in front of the operating head makes it a cool working hammer. An air throttling regulator valve included with every hammer permits fine adjustment to accommodate all kinds of riveting, either on plain or heat-treated alloy aluminum, brass or soft iron.

Jig Legs and Buttons

STANDARDIZED legs and buttons for jigs and fixtures have been developed by *Rolyan Metal*

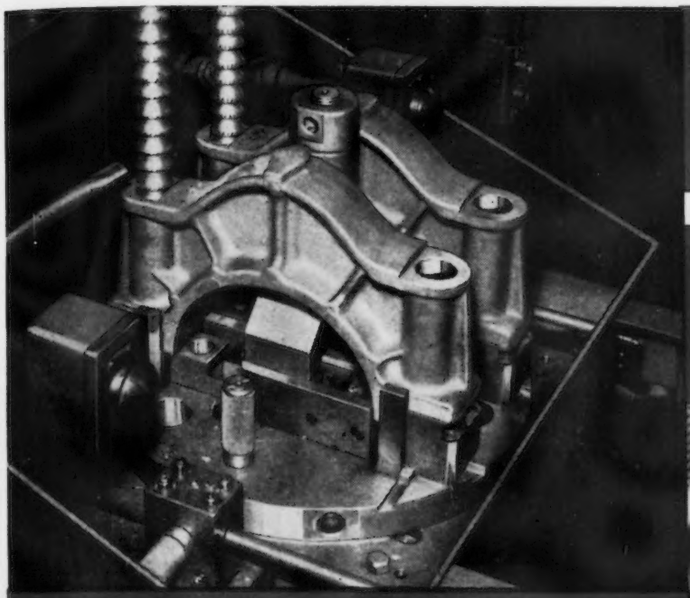


Products, 2330 W. 58th St., Chicago 36. These units are precision made for complete interchangeability. Shanks are knurled to assemble with a press fit in standard drill holes. Faces are grooved for chip clearances, hardened and ground to close tolerances.

Hand Tachometer

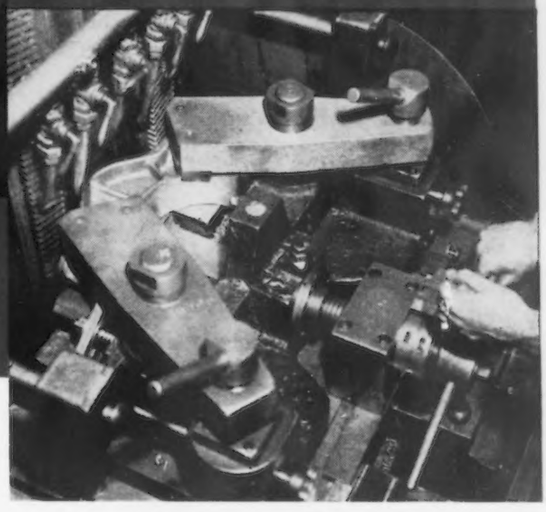
FIVE-RANGE tachometers have been announced by *Herman H. Sticht Co., Inc.*, 27 Park Place, New York 7. These wide-range hand

tachometers have a 3-in. dial with readability as close as 1 rpm per division, and a rotating gear shift in the knurled cover for changing to the five speed ranges. The instruments are nonmagnetic, of the centrifugal type, and well damped to eliminate oscillations. Four models are available for all speeds between 30 and 48,000 rpm.



OILGEAR Finish broaching of four bolt holes (1-9/16" dia.) in two forged steel caps is done in less than a minute by Oilgear Vertical Pulldown Broaching . . . which proved faster and more accurate and eliminated defect-producing scratch marks.

3/16" of stock broached from two bolt bosses simultaneously on Oilgear Vertical Broaching machine which also broaches 1¼" stock from two lock-fit and joint-face surfaces measuring 2¾ x 2¾".



In removing metal and finishing surfaces such as these

. . . Oilgear broaching reduced operations and saved $3872.00 a month

How much can Oilgear Save for YOU?

The parts pictured in the two photographs shown above are main bearing cap forgings used in a well-known Diesel engine. Formerly, these forgings had to be milled . . . planed . . . hand-scraped . . . drilled . . . reamed . . . and bored before they were ready for assembly. Now, with Oilgear Broaching, the task is much simpler. Two bolt bosses, two bolt holes, lock-fits and joint-faces are rough and finished broached. That is all.

The consequences are amazing: More than $60 saved in direct costs for each set of bearing caps, an average of $3872 a month; an abrupt production jump; a far lower investment in equipment; lower tool cost per cap; closer machining tolerances for faster, easier assembly; better finish; less maintenance; less part distortion; less floor space; less power consumed. Oilgear Broaching may well do as much for you.

The time has come for every industrial executive again to take costs seriously. The time has come for every industrial executive to investigate Oilgear Fluid Power Broaching for the tremendous impact it can have on costs of every sort. Get the facts *NOW*. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee 4, Wisconsin.

OILGEAR BROACHING MACHINES

Oilgear manufactures a complete line of broaching machines . . . horizontal and vertical for every internal and external broaching operation. The superiority of Oilgear Broaching Machines results essentially from the recognized superiority of Oilgear Fluid Power. High broaching and return speeds are independently adjustable. Simple push-button controls provide manual, semi-automatic or full automatic operation. Machine, power system and tools are fully protected against overload. Power is consumed in proportion to speed and load only.

Oilgear Fluid Power

Assembly Line . . .

WALTER G. PATTON

• Continued shortages of long list of essentials and unbalanced industrial production frustrate auto output. June estimates fall to 100,000 cars.

DETROIT — The Automobile Manufacturer's Assn. has undoubtedly built better than it knew in staging the greatest demonstration in the history of the motor industry at precisely the time when the picture of motor car production is overhung with the deepening shadows of closed plants and supply shortages.

With many strikes behind it and more work stoppages just over the horizon — with an appreciable period of waiting for steel in prospect (especially sheet and strip), it is going to require a lot of the stuff that made the automobile industry great to get assembly lines rolling again at the 5 million gait nearly everyone had expected to reach by midsummer 1946.

Instead of a 500,000 car month, June now looks more like a 100,000 car month assuming all factors such as parts and coal supply, transportation, work stoppages and raw materials take a turn that favors production rather than frustration.

A ready explanation for the frustration of the automobile industry caused by strikes in suppliers plants is to be found in a tabulation made recently by the Ford Motor Co. showing the long list of essentials for which Ford is dependent on outside suppliers. The list becomes more impressive when it is recalled that Ford has always been one of the most highly integrated and self-sustaining plants in the motor industry. The fact of the matter is that finished parts costing approximately $465 are currently bought from outside suppliers for each Ford car coming off the assembly line.

Some of the more important Ford parts made of metal and which are furnished 100 pct by outside suppliers include chassis stampings, tie rods, shock absorbers, wheel hubs and drums, ball and roller bearings, bushings, clutches, malleable castings, side body and door assemblies, rough clutch and brake pedals and many other parts. In addition, Ford is buying 25 pct of its chassis frames, 40 pct of its finished wheels, 50 pct of its finished torque tubes and 50 pct of its carburetors from outside sources.

Only a casual examination of the list is required to show that no cars can be built if even one of these items is in short supply and even though generous stockpiles of every other item on the list are available.

The stopgap tactics being adopted by some of the motor companies to combat hand-to-mouth deliveries of parts are interesting. In the case of Ford, for example, desperately short items have frequently been delivered by plane. Steel made at the Rouge has been sent to makers of terneplate who required the material for gas tanks but were not being served by their usual steel suppliers. The effect of this move was, of course, to reduce temporarily the available Ford steel mill capacity; yet the need for gas tanks was acute and no other solution could be found.

ON another occasion Ford found it necessary to redesign the whole setup of scuff plates in order to use the only available material which consisted of synthetics and a new metal. This entire change in processing was made necessary by Ford's inability to obtain hot-rolled galvanized strips.

Perhaps the significance of Ford's dependence on outside suppliers and the exertions the company has had to put forward to keep in production lies in the fact that even after the coal strike and the railroad strike are forgotten, the motor industry will still have to depend upon *balanced* industrial production throughout all industry before high motor car output, and resulting cost cutting can be achieved. This, in turn, it is hoped will make it possible for the individual to buy a car at somewhere near the price he expects to pay.

Kaiser-Frazer's answer to widespread speculation as to when K-F cars would become available to the public came dramatically in the form of an announcement that the Kaiser Special is now on the assembly lines at Willow Run and that these cars will soon be in the showrooms of more than 4000 dealers. Simultaneously, it was revealed that the 1947 Frazer will begin moving to distributors and dealers in June.

The conventional rear wheel drive, Kaiser Special, came to the industry as something of a surprise even though it did verify persistent rumors here to the effect that introduction of the Kaiser would undoubtedly be delayed by manufacturing difficulties encountered with the front wheel drive mechanism. According to the latest announcement, introduction of the Kaiser "will follow at a later date."

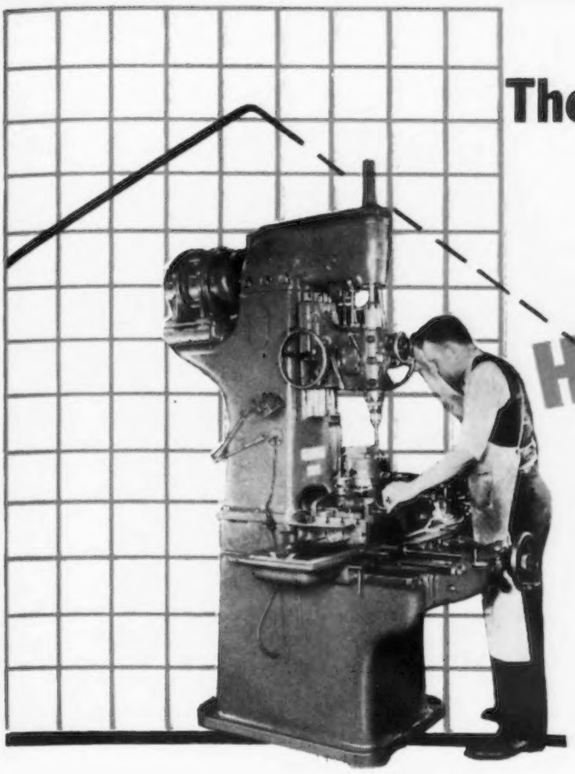
Coupled with the announcement of the Kaiser Special, Chairman Henry J. Kaiser disclosed that all-important steel for the new car is now being shipped in ingot form by the Kaiser Fontana steel mill in California to "Midwest steel centers" for processing into automobile sheet. Where these steel centers happen to be, no one seems to know;

Ford Contract Ratified

Detroit

• • • Ratification of the union contract between Ford Motor Co. and the UAW (CIO) involving retroactive pay amounting to approximately $12 million has been announced by Richard T. Leonard, union vice-president and director of the Ford department.

Leonard said that 38 locals including Rouge Local 600 had approved the contract. Five locals dissented. The contract was signed Feb. 26, and provided an 18¢ an hr. wage increase retroactive to Jan. 5, subject to union ratification.



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INFLATION is our country's greatest menace today.

INFLATION is caused by low production inadequate to meet the demand for goods. Low production is caused by:

Restricted productive operation
High production costs

INFLATION can be licked by:

Increasing production
Cutting production costs

Cutting production costs is the function of the machine tool. Thus, today, the machine tool builders of America are meeting this challenge of inflation and are creating an opportunity to help build an expanding economy for the nation.

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and some people are asking whether such processing is an accomplished fact or merely a statement of intention.

In any event, using the present method of supply, it looks like K-F will have to pay at least a third more than its competitors for sheet steel.

Continuation of this source of supply for the long pull appears to be highly improbable. A more likely answer is that K-F would eventually have to make good on its promise to take over existing facilities of a "Midwest steel plant," and make other arrangements to obtain ingots.

Cars are being produced at Willow Run but only, it is reported, on a hand-built basis. There can be no doubt that K-F has made remarkable progress in setting up production lines that will function at production line speed once tooling and equipment are available in the required quantities. In the meantime, and at the present rate of production, it is going to take quite some time to stock each of K-F's 4000 dealers. When the public will have **K-F cars in quantity** is such a speculative matter that few can be found who are willing to hazard even a guess.

THERE is occasionally a humorous side to the shortages that are plaguing Detroit industry. For example, a manufacturer of compressors recently registered a vigorous protest with a local parts supplier, claiming that the required mirror-like finish on certain compressor parts was erratic and not within tolerance limits. The parts supplier explained he had no refrigeration equipment and until he could get some he would be unable to guarantee satisfactory results from a honing operation.

The complaint was passed on to the producer of honing equipment who in turn got in touch with his supplier of refrigeration equipment, explaining the urgency of the matter and would he please do something about it. The producer of the refrigeration equipment said it was simply a matter of obtaining a compressor. He then tried everybody in the industry — including this particular firm—and got turned down flat.

You have undoubtedly guessed the end of the story. When the compressor manufacturer learned he had been helping to blow his own bottleneck by failing to deliver a compressor to this particular customer he sent one along with prewar promptness. Within 72 hr the equipment was installed. Now everybody is pretty happy about the whole thing — everybody perhaps except the producer of refrigeration equipment. He's still looking for compressors for his other customers.

UAW Major Aim to Be Uniform Wage Scale

Detroit

• • • **A uniform wage** scale throughout the automotive industry and a retirement plan for auto workers will be major objectives of the UAW (CIO). The adoption of these policies was emphasized by Walter P. Reuther, international president and George F. Addes, international secretary-treasurer in addressing 200 educational leaders of Plymouth local 51. "During my administration," Reuther said, "we will seek the same rate of pay for the same job across the whole industry."

Reuther insisted that the union must remove workers' wages as a factor in competition among manufacturers. Instead, he suggested that competition be based on better engineering and other factors.

Commenting on the recent changes in car prices, Reuther stated that despite the price increases granted General Motors, the result of the GM strike can still be considered a victory for the union.

Chapter Elects Officers

Detroit

• • • **The Detroit Chapter,** American Foundrymen's Assn. has elected A. H. Allen, Detroit Editor for Penton Publishing Co., chairman for the 1946-47 season.

Other officers elected include: Vice-chairman, C. E. Silver, Michigan Steel Casting Co.; treasurer, W. W. Bowring, Frederick B. Stevens, Inc., and secretary, R. E. Cleland, Eastern Clay Products Co. Four new directors serving 3-yr terms include: Pierce Boutin, Pontiac Motor Div.; E. J. Burke, Hanna Furnace Corp.; R. L. Orth, American Foundry Equipment Co. and W. N. Seese, J. S. McCormick Co.

Directors reelected include: John E. Linabury, General Motors Corp.; Gordon C. Creusere, Semet-Solvay Co.; G. L. Galmish, Michigan Malleable Iron Co.; Omer L. Allen, Pontiac Motor Div.; R. G. McElwee, Vanadium Corp. of America; G. Vennerholm, Ford Motor Co.; E. Lancashire, Detroit Steel Casting Co. and J. P. Carritte, True Alloys, Inc. E. C. Hoenicke, Eaton Mfg. Co., is retiring chairman and ex-officio board member.

o o o

REMINISCING: *To further the efforts of the Automotive Golden Jubilee, Henry Ford, founder of the Ford Motor Co., poses in the first car he built in* 1896. *His wife and their grandson, Henry Ford II, pose with him.*

o o o

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that Gives You . . .

EASY LOW TEMPERATURE HEAT TREATMENT

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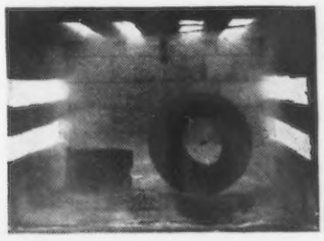

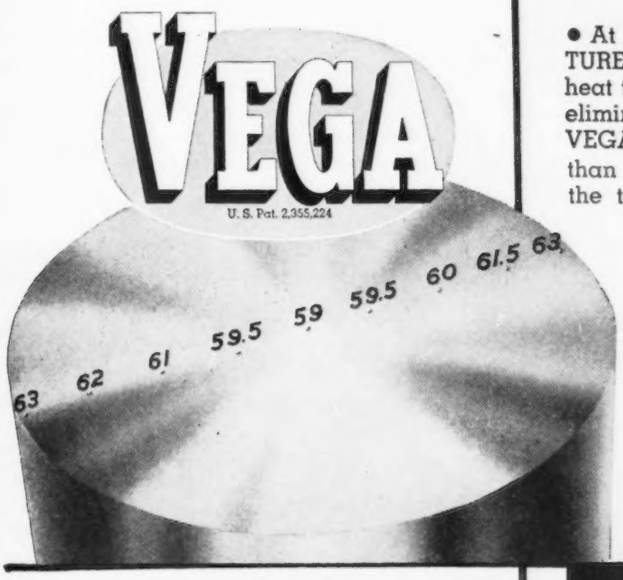

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UNIFORM HARDENING IN VERY HEAVY SECTIONS

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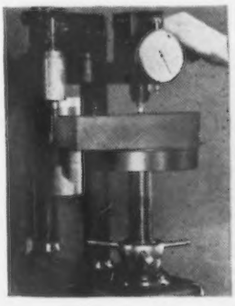

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Washington . . . L. W. MOFFETT

• Gwynne Bill limiting time for treble damage suits passes House over opposition of Justice Dept. . . . Adjournment may delay Senate action.

WASHINGTON — Private complainants in treble-damage suits against employers are placed under a statutory limitation of 2 yr in bringing action under provisions of the Gwynne Bill, HR 2788 which recently passed the House. It now rests in the Senate where it is generally conceded little chance for passage this session, not alone because of opposition but also because of the pressure of "must" legislation to be enacted before adjournment. The possibility of swift action if squeezed into the calendar cannot be overlooked, however, although this seems unlikely at the moment.

This is one measure which cannot be tagged as hasty legislation. It was introduced in the House in March 1945, where it was given lengthy hearings and reported out of committee in November. It was finally dusted off and brought up on the House floor on May 20, under an open rule permitting floor amendments and passed after 2 hr of debate.

Much of the testimony before the committee had to do with the Fair Labor Standards Act and the dire effect the bill's opponents feared it would have upon that act. The opposition held that the Gwynne Bill would discourage voluntary compliance with labor laws by fair-minded employers because they must meet competition of less scrupulous ones who cut costs to the bone at the expense of labor's pay envelope. Others maintained that the bill would be harmful to employees who do not know their rights or when they are being violated.

When the wage and hour law was first enacted there was no limit as to time in which an aggrieved employee could bring action against his employer for violation of the act, such as failure to pay the minimum wage or overtime as provided under the law. He could bring action in one day or 10 yr or still later. Since everyone was more or less confused in the beginning, it is understandable that no limitation was set at the time. However, since then the provisions of the law have been widely explained by government agencies, have been broadcast by radio, and have appeared in trade and workers' press while union and other workers' representatives have been busy pointing out worker rights in respect to the wage-hour legislation. It must be conceded that the average worker understands his rights fully as well as the employer.

Some of the reluctance to act at this time was expressed by the opposition as stemming from the fact that there are now pending in Congress certain amendments to the Fair Labor Standards Act, one of which would provide a 3-yr limitation for employee suits. Backers of the Gwynne Bill, however, preferred not to place dependence on the probability of passage of these amendments and pressed for their specific legislation.

Statutes of limitation are fixed to serve two chief purposes—to discourage unnecessary litigation, and to assure action while evidence and testimony are fresh and equally available to both parties concerned. Numerous cases were cited at the committee hearing in which suits were brought after a number of years. In the meantime, by reason of death or the shifting of workers from one plant to another, witnesses were difficult and even impossible to round-up; records had been lost, mislaid or even disposed of as no longer of value. Employers had no defense other than memory and protestations of good intent.

GOOD intent and good faith, however, offer little help in litigation of this type. This is particularly evident in the growing lack of uniformity of interpretations of government regulations and orders. Many times businessmen have relied upon "official" decisions of one government bureau as to the proper application of some regulation only to learn too late that the ruling they had relied upon had been over-ridden by another and more powerful agency which had revoked, amended or rescinded it and that therefore they had been operating illegally.

Once upon a time, the courts looked to the intent of the defendant and gave this factor considerable weight in making the final decision. The present-day trend is to remove such prerogatives from the judiciary and leave it as little discretionary power as possible.

In making a decision of this kind recently, the court commented:

"Since the act has been violated in good faith in this case, we would, indeed, like to hold that it is discretionary . . . It seems a keen injustice for employers, bewildered by strange legislation and divergent authority in courts, to be subjected to such a measure. Yet, no matter how much we lament its harshness, the section appears to be mandatory, and virtually all the courts have so construed it."

It was in an attempt to amend this inequity that the Gwynne Bill was written. As passed by the House it contains a provision that protects employers who have followed in good faith the multitudinous and often conflicting directives, orders, regulations and interpretations of the government concerning wage and hour laws. It provides, in effect, that an employer who pays such wages and observes such hours as ordered and directed cannot later be held liable for the treble-damages if such regulations should receive a new interpretation, be amended or rescinded.

On the other hand, it does not excuse or acquit an employer from paying whatever wages are justly due or for the hours the employee may have served. It does discourage irresponsible litigation. Nor does the 2-yr limit apply dur-

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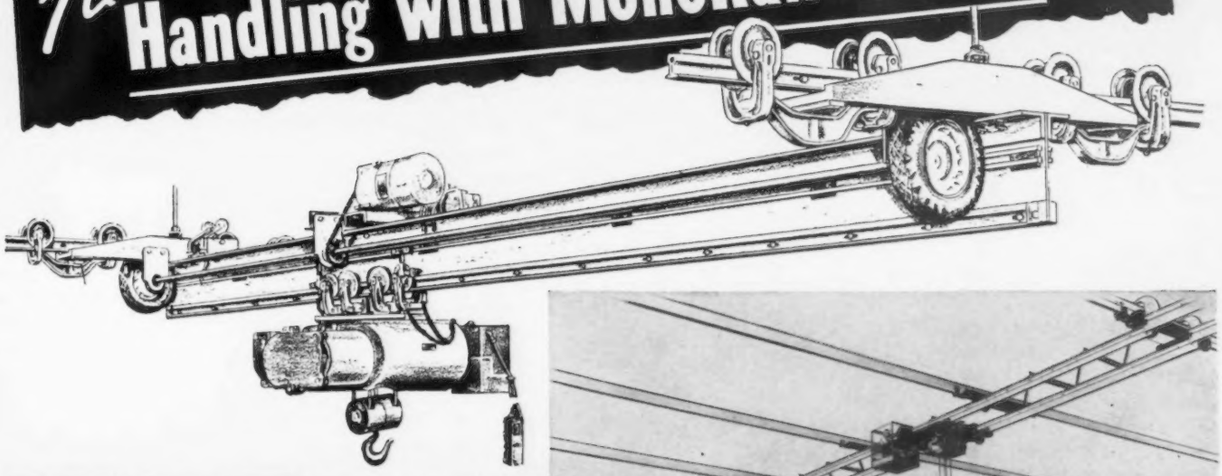

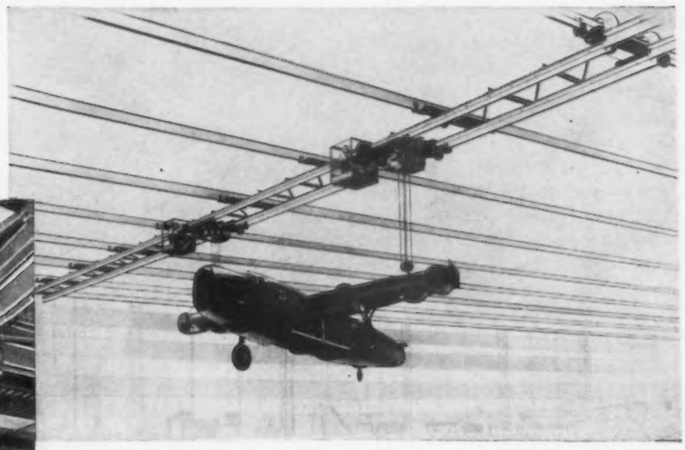

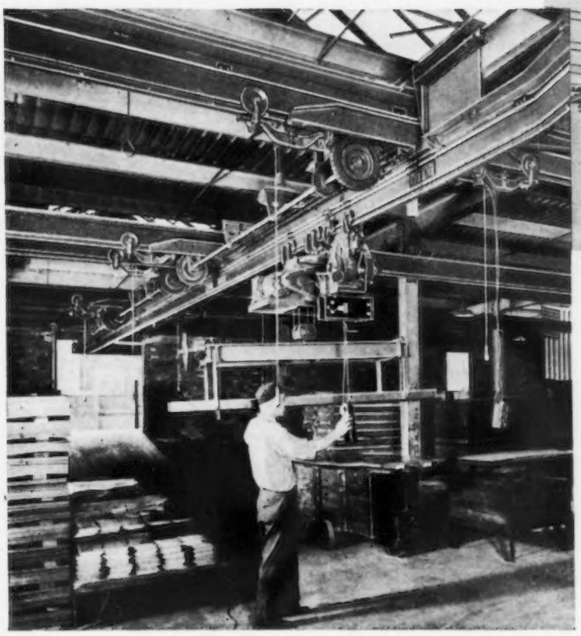

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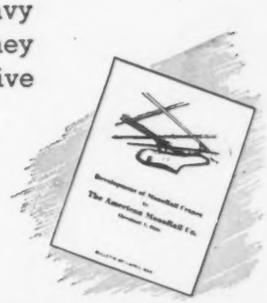

THE AMERICAN MONORAIL COMPANY

13103 ATHENS AVENUE — CLEVELAND 7, OHIO

ing such time as the defendant may be out of the country or otherwise beyond jurisdiction of the courts.

Notwithstanding the implied court disapproval of the present situation, the Justice Dept. has been one of the most vehement opponents of the Gwynne Bill. Attorney General Clark attacked it as "highly detrimental to the interests of the government," holding that it would fix a 2-yr limit on many actions brought by the government. This would appear to be a rather weak argument since the bill does not cover criminal prosecutions, injunctions or special actions.

A forceful refutation of the Clark charge is found in the fact that in common law any restrictive statute is not binding on the state unless the state is specifically named in the statute. This has been affirmed time and again by the Supreme Court. Furthermore, framers of the bill had no intention of restricting governmental action and just to guard against a possible slip-up, a floor amendment was added specifically exempting the government from provisions of the act.

THE chief irritant to the Justice Dept. appears to be that the Gwynne Bill would deprive it of a very effective club it has held over the head of private business —fear of tremendous treble-damage actions abetted by and resulting from decisions for the government in anti-trust proceedings.

Under common practice, private suits or actions are given the benefit of the final disposition of the government's criminal or equitable suits in connection with the wage-hour law. It has been provided that a decree of violation won by the government shall be considered prima facie evidence against such defendants when a subsequent private suit is instituted.

In effect, this places the government in the position of having its legal staff unearth most of the evidence on which such suits hinge. Once a violation is established by the Justice Dept., the way is open for private parties to obtain the service of an astute lawyer and go after an employer, firm or corporation with hammer and tongs with the eventual result virtually assured.

Under existing laws, an indictment may be found or information instituted by the government under the anti-trust laws any time within 3 yr after the offense is alleged to have been committed. Obviously, in many instances of treble-damage suits, the private plaintiff and his attorney could no longer depend upon the government's legal lights to provide them with the backbone of their suit. This fact was duly noted by Clark in a letter to the House Judiciary Committee.

"Under the proposed legislation," he declared, "it will be necessary for the government to institute proceedings within 1 yr after the cause of the action has accrued to a private person in order that such person may take advantage of the government's proceedings."

"The deterrent effect of the possibility of treble-damage suits occupies an important place in the well-rounded anti-trust program," he added. This apprehension rises from the fact that sometimes 2 or 3 yr are needed to prepare a government case.

In its concern over possible effects of the pending measure upon the department's anti-trust program, it overlooks the fact that the government itself is getting nicked for treble-damages which may well amount to several billion dollars. It was pointed out at the hearings that many contractors who operated on the cost-plus basis for the government during the war are now being sued for treble-damages on one pretext or another.

The legal counsel for one such firm said that his company alone had more than 300 suits against it; at the time of the hearings last year it was reported that more than 5000 suits had been entered against contractors for the War Dept. which might result in court-directed payments for as much as $2 billion. Navy's responsibility could be expected to be not far behind that of the War Dept. The extra money these firms are compelled to pay must come from the Treasury since the Comptroller General has ruled that under such contracts the government must reimburse the contractor.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THIS ONE'S A CENTER GAUGE-- THIS IS A BEVEL PROTRACTOR-- HERE'S A MITER HEAD--AND THIS IS A KNURLING TOOL!
WHAT'S KNURLING ?
HA-HA! WITH MACHINES DOIN' NEAR EVERYTHING NOW, A MACHINIST'S TOOL BOX WILL SOON BE A BOX OF ANTIQUES!
IT'S COMIN'! A NEW KID SEZ, "HOW DO YOU RUN THIS MACHINE?" TH' BOSS SEZ, "WIPE OFF TH' KNOBS, YOU FOOL--IT TELLS YOU ON THEM!"
6-7 J.R.WILLIAMS
THE CURIOS
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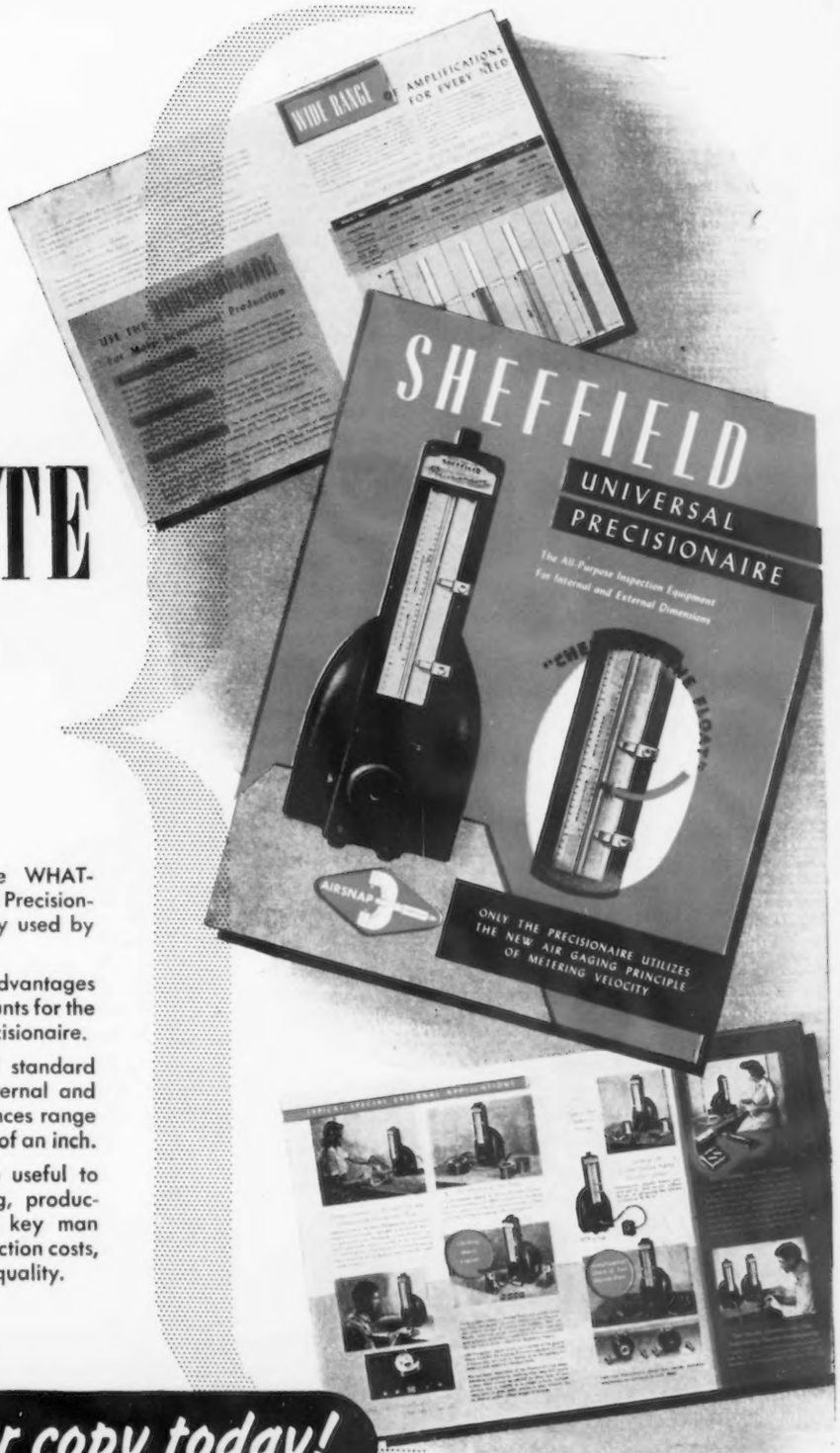
Gear Base Prices Raised

Washington

• • • **OPA Order No. 637 under RMPR 136, effective May 27, allows base prices of all gears except gearmotors to be increased 13 pct. Gearmotors were increased 13 pct or more.**



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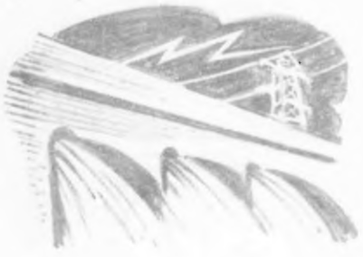
ROBERT T. REINHARDT

• Overseas scrap is attractive to buyers confronted by shortages and ceiling prices . . . Full wage increases not allowed in price appeal . . . $3.5 million estimated cost of Los Angeles steel plant.



SAN FRANCISCO — Belgium and the Hawaiian Islands as sources of iron and steel scrap would have seemed a little remote by local scrap buyers a few months ago, but today negotiations are being made in those directions. As prices for better grades of scrap hit OPA ceilings on the Coast, buyers are investigating every possible source of supply, not only in the hope of getting material at lower prices, but also to assure stock piles at the furnaces sufficiently high to prevent curtailment of production.

Shortage of scrap on the Coast is in marked contrast to the condition which existed a few months ago when Midwest steel producers invaded this area to purchase large tonnages of choice shipyard scrap. At the hearing before the Interstate Commerce Commission in January, (THE IRON AGE, Jan. 31, 1946, p. 88), where efforts were made by local steel producers to set aside a low freight rate temporarily granted on movement of scrap to the Chicago district, it was shown that large tonnages of select shipyard scrap had gone to dealers at less than $9.00 per gross ton and that mill buyers had bid between $2.25 and $6.00 per gross ton. It was alleged at the hearing that approximately 300,000 gross tons of this scrap were then available in the Pacific Northwest.

Even though local scrap users were unsuccessful in their fight to have the special rate suspended, and, it was put into effect for a four-month period, (THE IRON AGE, May 9, 1946, p. 98), they are of the opinion that but little scrap is moving East and that the present tightening of the market is largely attributable to factors they foresaw when protesting the low rate. Among these are: Little or no production scrap from industries hampered by labor troubles and material shortages; delays in release of scrap by Army and Navy; exceptionally heavy scrap charges in western furnaces because of the pig iron shortage; and the salvage and use of much material which would ordinarily be junked.

The Los Angeles area has been particularly hard hit as the steel plant of Kaiser Co., Inc., at Fontana has become an increasingly large user by charging as high as 85 pct scrap. It is reported that recently production of its 1200-ton capacity blast furnace has been reduced to 400-tons per day. Closing of the Army Segregation Center in that area which formerly supplied a limited amount of material will not help the situation. It is understood that salvage material which formerly went there will be diverted to the other two depots of the kind at Berkeley, Calif., and Seattle.

In view of the situation which dealers believe will get worse before it gets better, one important scrap buyer is negotiating for large tonnages of material from the Belgium Government which is said to be available at a cost sufficiently low to permit its shipment to the Pacific Coast at competitive prices. This same buyer is also stimulating the shipment of wrecked heavy equipment from Hawaii. Both operations are dependent on the availability of ships which, while in evident inactivity in large numbers in the San Francisco Bay, apparently are unavailable for use.

* * *

CAUGHT in the squeeze between increased labor costs and price ceilings, 56 northern California metal trade concerns employing approximately 4500 persons, are unable to ask for price relief based on the full $1.50 per hr recently given boilermakers, welders and flange turners, but instead will be allowed to petition on

METALLURGY PLUS: *Miss Lucille Brinkman, full-fledged metallurgist for Bethlehem Pacific Coast Steel Corp., wonders why more girls aren't interested in this branch of science. She was the only girl in her metallurgical classes in Michigan College of Mines and went to Bethlehem after experience with other industrial plants.*

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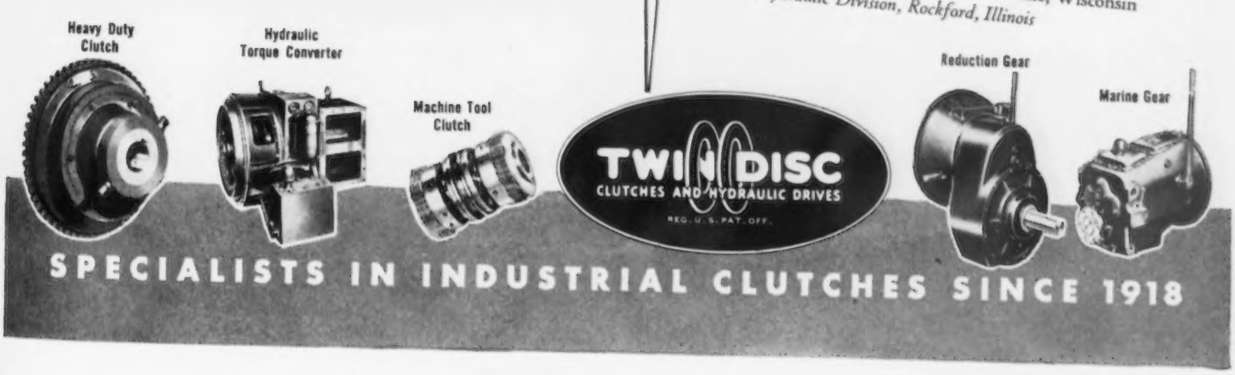
To slide rule and formulae add catalytic force... the foresight and experience of the design engineer. Here's a proved *prescription for progress*... Industry's elixir for improvements to come.

In the manufacture of industrial power links, this same combination of foresight and experience determines gains to be made.

For 28 years now, the manufacturers of Twin Disc Clutches and Hydraulic Drives have stressed experience... emphasized research... at the same time looked and worked *ahead* to meet changing power requirements with *proved power links*. As a result of this far-sighted policy have come improvements in the transmission and control of power... important additions to the diversified line of Twin Disc Clutches and Hydraulic Drives.

If the vital connection between driving and driven units is a problem in your equipment, take advantage now of recommendations by Twin Disc Engineers. Their long experience and advanced approach are your best assurance of profitable advice. Write today.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

a basis of $1.47 per hr, according to the Tenth Regional Wage Stabilization Board. The wage increase was granted in the settling of recent labor disputes.

Proposed increases in seven other wage classifications which amounted to 15 pct were approved by the board. The increases which were deemed inapplicable in full for pricing petitions amounted to 17 pct. The board maintained that approval could be granted only to the extent of the 15 pct pattern of increases existing in related industries.

Under this ruling the companies making the application will be permitted to use the full amount of all proposed wage increases in requesting price relief from OPA except in the three classifications where the requested increase was in excess of 15 pct. In these three exceptions the requested rate of $1.50 may be put into effect without objection, but a maximum of $1.47 may be used in seeking price relief, according to the board.

LOS ANGELES—R. J. Merritt of O'Keefe & Merritt Co., which last week announced plans for a 50,000 ton sheet mill here, reports that the 17-acre site for the plant has been purchased in the central industrial area and that details for the project are being completed by Loftus Engineering.

According to Mr. Merritt, the operation will include three small openhearth furnaces and used mill stands capable of finishing sheets in gages of from No. 10 to 28. Galvanizing facilities for sheets are being considered.

Associated in the venture with Mr. Merritt is D. P. O'Keefe and W. J. Boyle who also has an interest in the company. All three men have been closely identified with the metal-working industry for the past 25 yr. Mr. Merritt and Mr. O'Keefe worked in the sheet metal shop of the Boyle Mfg. Co. in their early years and with the Pacific Stove Co. before founding their own company for the production of stoves and refrigerators. They now employ approximately 700 men and women.

It is understood that arrangements for the financing of the project, which is estimated by Mr. Merritt to cost approximately $3.5 million, have been completed and include the support of several other large sheet metal users in this area. These sheet fabricators will absorb the plant's production which is considerably in excess of the requirements of O'Keefe & Merritt Co., it is reported. Corporate name and financiers have not been revealed.

To determine the effects of the steel and coal strikes on local steel fabricators of various kinds, the Merchants & Manufacturers Assn. conducted a spot check among 19 industries which showed that 1/3 had reduced operations from 25 to 50 pct with layoffs approximating 40 pct of the normal working force.

Three of the plants checked had been forced to close down completely because of a lack of materials and another expected to close within 30 days unless additional material was received in the meantime. It was reported that at least 50 pct of the plants had been adversely affected by the recent national strikes.

Because of its brevity and the heavy reliance on trucks for local shipments, the rail strike apparently had but little local effect.

SALT LAKE CITY—Utah's four and a half month old mine and smelter strike, which has the dubious distinction of being the longest strike of any magnitude in the country, is still in a stalemate. However, the increase in ceiling prices for copper and lead plus approval of the McFarland amendment to the emergency price control act extension by the Senate Banking and Currency Committee, furnishes a ray of hope that it will soon start breaking up.

The McFarland amendment extends the premium price plan on metals to June 30, 1947, liberalizes it in several respects and carries an appropriation of $100 million to cover the cost of premium payments.

The boost of 2⅜¢ in the price of copper and the 1¾¢ in the price of lead for operators who have had wage increases approved would be insufficient to keep many of the high cost properties in operation it is believed by observers. Officials of the CIO International Union of Mine, Mill & Smelter Workers agree that mines employing thousands of their members would be forced to close without the premium price plan to supplement the ceiling price increases.

Negotiations between the union and the struck Utah companies have been on non-wage, fringe issues thus far, but with the price situation clarified as much as it is likely to be in the near future there seems to be no reason for longer delaying negotiations on the major issue of wages.

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PUBLIC INTEREST: *Crowds flock to see a flying demonstration of the Army's* P-80 *Shooting Star, jet-propelled fighter. Here is a close-up of planes which came to the Washington National Airport from March Field, Calif.*

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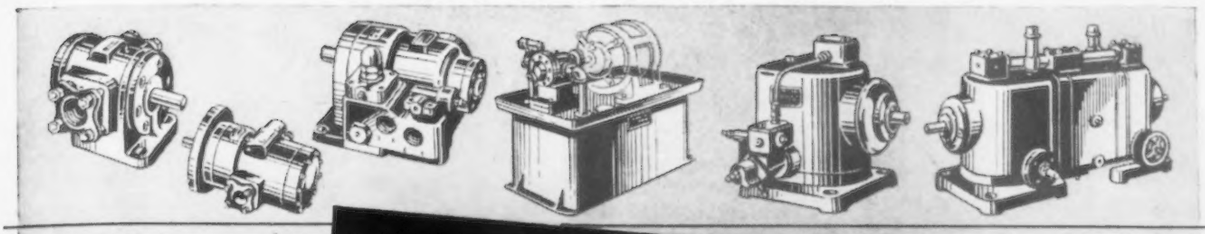

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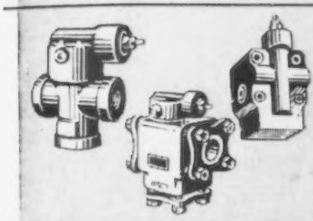

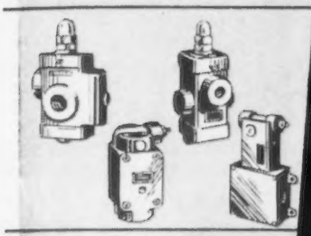

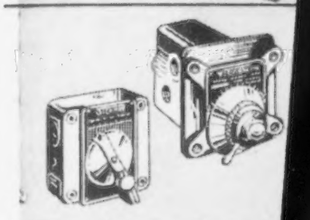

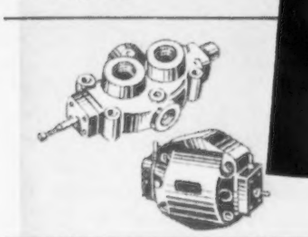

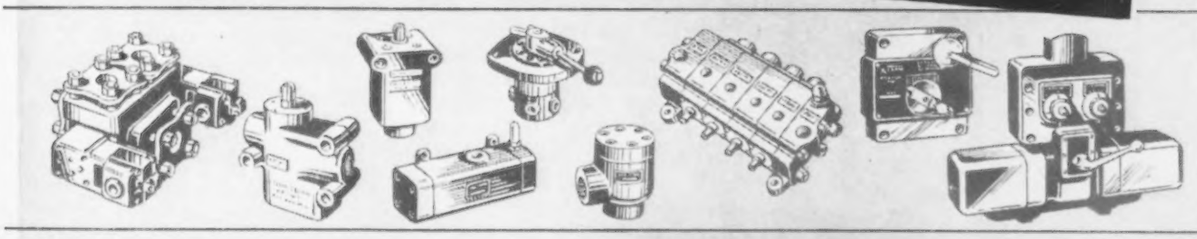

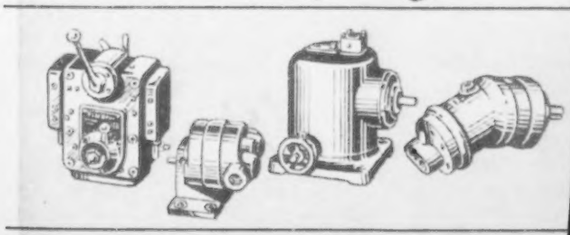

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European Letter . . .

JACK R. HIGHT

• Paris international fair shows hundreds of machine tools on 2-yr delivery . . . Galvanized hut at $150 captures imagination of homeless peasants.

LONDON—The International Paris Fair represents ambitious efforts on the part of hundreds of exhibitors of machinery and foundry products, but conversations with the representatives present reflect all the confusion that controls trading in Europe.

Machine tools are present from factories in Paris, Vienna, Turin, Milan, Basel, Coventry, Cincinnati and Milwaukee, but few people have tools to sell. Two years is a normal delivery promise with certain exceptions. In the case of countries with a serious dollar shortage, for example Switzerland, there is evidence of some anxiety to make deliveries promptly to the firm that can pay in dollars. But to the average potential buyer here at the fair, dollars are the one thing harder to get than machine tools.

For the ambitious British machinery dealer, who came to the fair in the hopes of beating 50-week delivery promises common from United Kingdom producers, there was no relief in sight, even if he had prospects of obtaining an import license.

While the crowds at the opening weekend of the fair were large, and the congestion in all the halls was serious, it was the vendor of the little useful household items that was the biggest news at the fair. With all France starved for consumer goods within range of the small income groups, it was the common man who was conspicuous. Within two or three hours of arrival, it would be possible to itemize all the aluminum pans, spoons, and utensils on sale, as there were so many people carrying them.

True enough, most of the household goods were for display only, with delivery in the dim future, but there was just enough for sale to cause a commotion at each booth.

The single item of greatest interest to the poorly paid French visitor was a galvanized sheet hut, roughly of the Quonset type with the added character of an umbrella tent shape. I have seen no more indication of the pathetic plight of the homeless in Europe than the hundreds I saw milling about this ugly cheerless shelter clamoring for information on costs and deliveries. The hundreds who were interested in this display were not the well-dressed foreigners, nor the generally smart appearing Parisians, but rather the shabby peasants who were in the city for one of the fetes that is so important a part of French life.

There could be no joy in the prospect of living in such a structure, but at 18,000 francs (approximately $150) for the steelwork it represents a roof at an attainable price. The production chief of the organization offering this shelter reported that he has capacity for 4000 tons of such flat-rolled sheet per month, and that his present actual production is only about 25 pct of capacity. He stated that he would like to get in contact with an American zinc producer with the possibility of doing 300 tons of business per month at some time in the future, but he is at present obtaining his supplies from Belgium.

Exhibitions from American manufacturers were scarce, although some were represented, principally through associated agents in Paris. The contrast between American exporting efforts and British was notable in one respect to every casually interested Frenchman. I think nearly every British machine on exhibition carried all its printed matter in French, while only English was to be found on the American samples.

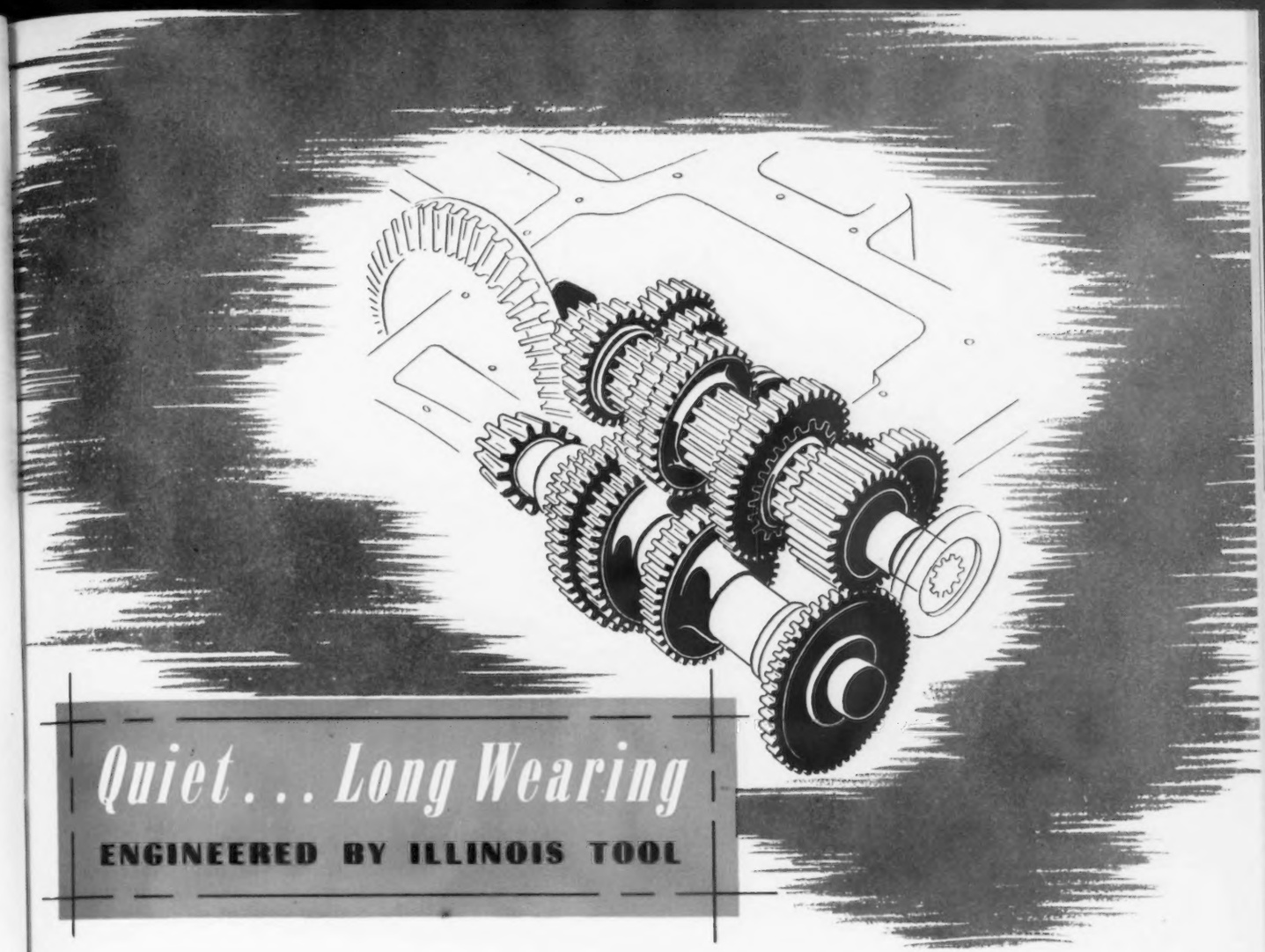
I saw little effort to emphasize the new, the different. Almost every exhibitor was as anxious as possible to put up a bold front of being as nearly as possible to prewar normal, without thought of great strides forward. The tardiness of arrival of many displays, many of which were only arriving two or three days after the opening, reflected the difficulties of transport and arrangement. Heavy tools from Italy and Czechoslovakia on display represented what must have been an untold amount of energy and patience to overcome the political and mechanical barriers that exist against the free flow of goods between European states at present.

AT a luncheon for 40 members of the British Gauge & Tool Makers' Assn. the director of the Paris fair sounded the keynote that was re-echoed by every metal working exhibitor. "If. . . . France gets more coal, and if. . . . it is used to produce more steel, then production will expand rapidly." And if there is no increase in supplies of coal for steelmaking, then there is no predicting when French industry may recover.

Large quantities of aluminum left available in France after the liberation, and continuing aluminum production makes the light metal picture somewhat easier. Interesting example of the effect on manufacture was the passenger car frame in the exhibit of the French aluminum firm. It will be used in one of the new small cars.

Prices for all the products are high, with the simplest type of three burner gas stove being offered for about the equivalent of $60 in francs. Interesting to note was the fact that in France no production of handsome enameled stoves is permitted, only a black finish is allowed, while the stoves being produced in the Seimens combine in Vienna come under no such restriction.

A new line of French-built agricultural tractors was on display, under the name Tractavia. This firm reported that present production amounts to about 20 per month, but stated that production is being organized to reach a peak of 20 tractors a day in early 1947. None of this production will go for export, and all sales are being allocated by the appropriate French Ministry. The standard unit sells for 225,000 fr. (approximately



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Living conditions in general have improved considerably in Paris in the past six months, but they are still far from satisfactory, unless one is overstocked with francs. Where in November there were only a dozen taxis in all of Paris and only two bus lines operating, there are hundreds of taxis today and many bus lines in operation. Restaurant prices appear to be at about their same level, but the food offered under the "maximum" or more . properly "nominal" price, seems a little more satisfactory than last year.

The battle of the French Government against the black market seems still to be a losing fight, and black market quotations for foreign currencies are well known to most citizens, despite increasingly severe penalties for all persons convicted of such operations. The American soldier is conspicuous by his absence in the Champs-Elysees today as he was by his roaring presence even as late as February of this year. The jeep, however, lingers on, a few being driven by French civilians, and several in constant use at Le Bourget airfield.

* * *

LONDON—The Minister of Supply has been pressed recently for details of the amount of modernization which has actually begun under the British Iron & Steel Federation plan for the industry. According to the minister's reply, 27 separate plans have been approved and licenses issued to proceed with construction. He indicated that the total cost of the plans included amounts to $64,000,000.

He also stated that 20 more of the most urgent sections of the modernization program have been approved, and the firms involved have been directed to furnish the details needed for the issuance of licenses. According to his statement these 47 plans will include all of the urgent sections that are ready for action at present.

In answer to a question from Anthony Eden, he denied that all of the program was being financed by private funds. This issue, of what liability the government will assume in buying the industries for capital improvements undertaken after the nationalization announcement, is one that is attracting widespread interest.

In the official report the minister gave the following list of the major plans on which work has commenced during the past six months:

Colvilles—New blast furnace at Clyde Iron Works.

Dorman Long & Co.—Ore preparation plant.

Guest Keen & Baldwins—Preliminary work on site of new strip mill at Margam (extension of Cornelly quarry to supply limestone to new Margam works).

John Lysaght—Modernization of sheet mills at Newport.

Richard Thomas & Baldwins—Electrolytic tinning plant at Ebbw Vale.

John Summers & Sons—New melting shop at Shotton.

Stewarts & Lloyds—Alterations to melting shop at Clydesdale. New tube plant at Mossend. Reconstruction of tube plant at Coatbridge. New melting shop at Corby. Increase in coke ovens at Corby. Extension to research department at Corby. Modernization of tube plant at Newport.

United Steel Co.—Modernization of boiler plant at Workington. New melting shop at Appleby, Frodingham. Replacement of cogging and section mills at Appleby, Frodingham.

Whitehead & Co.—Improvements to rerolling plant.

British Steel Group Clarifies Position On Government Plan

London

• • • **The British Iron & Steel** Federation has held several meetings since the announcement of the government's intention to nationalize the industry to decide on future policies. Although it seems likely that an important part of the discussions was devoted to the future status of the federation under government ownership, the statement issued following the meetings sounds only a belated condemnation of the nationalization plan.

The statement by Mr. Ellis Hunter, of Dorman Long Steel Co. and president of the British Iron & Steel Federation, indicated that the industry had been willing to accept public supervision, and indicated that prices under the federation plan would have been related to the costs of efficient units of production. In his opinion nationalization "of sections of the industry would tear the heart out of the most efficient organizations . . ." The full text of the statement follows:

"We are opposed to the nationalization of any section of the group of industries commonly known as the iron and steel industry because we believe it would be injurious to the efficiency of the industry and to national recovery. We are not opposed to public supervision. On the contrary, the industry willingly operated under public supervision for several years before the war.

"We welcomed the prospect of close cooperation with the government in the reconstruction of the industry and submitted to the Ministry of Supply a plan of development which has now been published.

"Organization within the industry provides a guarantee that this development will be carried out effectively and speedily and that the highest level of efficiency will be reached as quickly as plant and engineering resources can be made available.

"Prices will be related to the costs of efficient units of production.

"The government's motion, due for debate next week, refers to the nationalization of sections of the iron and steel industry 'with a view to its efficient organization in the public interest.' This efficiency is also our purpose and we hold the firm belief that it can only be achieved quickly and effectively under our plan and policy, which includes public supervision.

"Nationalization of sections of the industry would tear the heart out of the most efficient organizations and destroy the best hope of raising the general standard of efficiency in the industry.

"The shadow of nationalization is already frustrating the industry's major plans for reconstruction and imperiling the realization of the plan of which they are a vital part.

"By prejudging the issue the government will place the proposed control board in a false position and sacrifice the public interest that it desires. to serve."

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Borger, Texas . . . . . Hart Industrial Supply Co.
Houston, Texas . . . . . Champion Rivet Co. of Texas
Kingsport, Tenn. . . . . Slip-Not Belting Corp.
Knoxville, Tenn. . . . . Slip-Not Belting Corp.
Albuquerque, N. Mex. . . . . Industrial Supply Co.
New Orleans, La. . . . . The Gulf Welding Equipment Co.
Oklahoma City, Okla. . . . . Hart Industrial Supply Co.
Pampa, Texas . . . . . Hart Industrial Supply Co.
Phoenix, Arizona . . . . . Arizona Welding Co.
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Tulsa, Oklahoma . . . . . Hart Industrial Supply Co.

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Indianapolis 2, Ind. . . . . Sutton-Garten Co.
Kansas City, Mo. . . . . Welders Supply & Repair Co.
Milwaukee, Wis. . . . . Machinery & Welder Corp.
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PERSONALS

° ° °

• **Ralph L. Wilcox** has been appointed assistant factory manager of the Detroit plant of Gerity-Michigan Die Casting Co. For 16 yr, he was technical representative in the Chicago office of the New Jersey Zinc Co. During the war, he was a dollar a year man in Washington, serving as zinc consultant to the WPB.

• **Francis K. McCune,** formerly assistant works engineer of the General Electric Co.'s plant at West Lynn, Mass., and **Bruce R. Prentice,** formerly assistant to the engineer, Aeronautics & Marine Engineering Div., have been appointed member of GE's apparatus design engineering staff at Schenectady.

• **Jasper E. Crane,** vice-president and member of the executive committee of E. I. du Pont de Nemours & Co., Wilmington, Del., has retired, and **Dr. Crawford H. Greenewalt,** assistant general manager of the company's pigments dept., has been selected to succeed him. **James B. Eliason,** vice-president and treasurer, has also retired, and **Walter J. Beadle,** first assistant treasurer, succeeds him. Mr. Beadle is succeeded by **T. C. Davis,** assistant treasurer of the company. Mr. Crane and Mr. Eliason will continue as members of the board of directors. Mr. Eliason will also retain his membership on the finance committee.

• **W. B. Herbert** has been made vice-president and general manager of the New York office of Cinrock Machinery Inc. He was formerly one of their salesmen.

• **Don Smith,** formerly sales manager of the General Excavator Co., has been appointed vice-president and director of sales for the Milwaukee Hydraulic Corp., Milwaukee.

• **Clinton G. Thomas,** founder of the Thomas Steel Co., Warren, Ohio, has retired from all business activities including his duties as a director and chairman of the board. New appointments are: **Charles H. Lewis,** chairman of the board; **E. Milton Barber,** president; **William F. Rummell,** vice-president of sales; **Herman A. Mentall,** vice-president of operations; **Wilson D. Khonle,** secretary; and **Alton B. Walker,** treasurer.

• **Thomas A. Murphy** has been named manager of a newly established western division of aluminum sales for the Reynolds Metals Co. with headquarters at Los Angeles. His territory will include the west coast, the Rocky Mountain states and Texas. Mr. Murphy joined Reynolds in 1945 as aviation industry manager. Prior to entering the army he had been associated with Berry Bros. in Detroit and with United Aircraft.

GEORGE P. TORRENCE, executive vice-president as of July 1, Link-Belt Co.

• **George P. Torrence** will rejoin Link-Belt Co., Chicago, on July 1 as executive vice-president. He will succeed **William C. Carter** as president Nov. 1, upon the latter's retirement. Mr. Torrence was associated with Link-Belt from 1911 to 1936, when he resigned as president. He has been in Cleveland since 1936 as vice-president and general manager of the Rayon Machinery Corp., a subsidiary of the Industrial Rayon Corp., and as president of the Cleveland Pneumatic Tool Co. The Link-Belt board of directors has created an executive committee consisting of directors Howard Coonley, Russell Livermore and W. C. Carter, with Mr. Carter as chairman.

• **William G. Hall** has been made manager of a combined Renewal Parts & Service Div., Reliance Electric & Engineering Co., Cleveland, succeeding **Arthur W. Ray,** who has retired after completing 40 yr with the company.

• **Carl S. Ablon** has been named manager of the Cleveland office of Luria Bros. & Co., Inc. He has been recently released from the U. S. Army Air Forces.

• **Milton Kutz,** assistant general manager of E. I. du Pont de Nemours & Co.'s electrochemicals dept., Wilmington, Del., has retired.

• **James P. Stewart** has been appointed De Laval Steam Turbine Co. special representative with headquarters in Trenton, N. J. Mr. Stewart, who for many years was connected with the Elliott Co., Jeannette, Pa., was recently the assistant general manager of B-W Superchargers, Inc., Milwaukee, division of the Borg-Warner Corp.

• **George P. Lehmann** has been appointed to the newly created post of assistant manager of the General Electric Co.'s Plastics Divs. Mr. Lehmann has been staff assistant to the manager of the Plastics Divs. since his return from service last fall. He was previously assistant to the chief engineer of the Plastics Divs. and also served as plant engineer at the GE Meriden, Conn. plant.

• **George L. Best,** who has been assistant vice-president of the American Telephone & Telegraph Co., has been elected vice-president of the Western Electric Co., New York.

• **Thomas J. Connolly,** formerly with Charles Williams & Associates, Ltd., has been appointed manager of the iron and steel dept. of Columbia Commerce & Credit Corp., New York.

• **Raymond J. Smith** has been promoted to general sales manager of the American Steel Band Co. of Pittsburgh, succeeding **Carl R. Mirth,** who goes to the Pacific Coast as sales representative of the company in both San Francisco and Los Angeles. Mr. Smith has been connected with the company for 15 yr. His duties recently have been those of division sales manager.

• **Thomas Lekich** has been appointed director of purchases, and **George Wolfe** has been made purchasing agent for Copco Steel & Engineering Co., Detroit. Mr. Lekich was associated for a number of years with Carnegie-Illinois Steel Corp., and prior to his present appointment was in the sales dept. of Copco Steel & Engineering Co. for 2 yr. Mr. Wolfe was a purchasing officer in the Procurement Div., U. S. Treasury Dept., before entering the service in 1942.

•**David M. Ramsay** has been appointed manager of the Industrial Div. of the National Radiator Co. of Johnstown, Pa. Mr. Ramsay has been with the company for 5 yr, having been a field engineer in the Boston office, assistant manager of the Industrial Div., and assistant to the manager of the Heating Div. in charge of specialty sales.

• **Howard F. MacMillin** has been elected vice-president of Bryant Machinery & Engineering Co. of Chicago. From 1921 through 1944 he was connected with the Hydraulic Press Mfg. Co. of Mount Gilead, Ohio, in various engineering and executive capacities and since 1938 directed the company as its president and general manager. In 1945 he became affiliated with Arthur D. Little, Inc., Cambridge, Mass., and is continuing a connection with that company.

HOWARD F. MacMILLIN, vice-president. Bryant Machinery & Engineering Co.

• **R. E. Shaeffer** has been appointed assistant works manager of the New Kensington, Pa. plant of the Aluminum Co. of America. **E. R. Hammond** has been appointed industrial relations manager at New Kensington and **J. R. Bell** has been appointed works chief planner. Mr. Bell succeeds **H. R. Werkheiser,** who has been transferred to the Alcoa, Tenn. fabricating plant. **H. B. Kale,** works manager of Lafayette, Ind. works, has been appointed to a newly created post of chief industrial engineer of the Fabricating Div. He will be succeeded as works manager of Lafayette works by **W. C. Winter,** formerly manager of DPC owned Cressona works.

• **Robert H. Davies,** formerly manager of technical service for the Parker Appliance Co., Cleveland, has been appointed to head a new Engineering Div. which will combine the previously separate functions of product development, product engineering and technical service. **Emmett C. Hartley,** who has directed Parker's research and product design activities, has been made manager of a new Special Products Div. which has been established to handle the manufacture and sale of rubber and plastic products. **Leland H. Schmohl,** a Parker veteran of 16 yr, will continue direction of product development in the new Engineering Div. as chief design engineer.

• **Frederick A. Stevenson,** president of the American Car & Foundry Co., New York, has been elected a member of the executive committee.

• **A. F. Morris** has been appointed chairman of the board of the Morgan Engineering Co., Alliance, Ohio. **W. H. Morgan, Jr.** has been named president; **A. T. Davis,** vice-president and sales manager; **C. E. Bertolette,** assistant secretary and treasurer; and **M. E. Rhue,** general production manager.

• **T. W. Prokop** has been elected secretary and **A. S. Freund,** treasurer, of the Max Schlossberg Co., Chicago. **Max W. Mabel** has been put in charge of the Scrap Aluminum Brokerage Div. recently established by the company.

G. E. GUDE, JR., vice-president, Wyatt Metal & Boiler Works

• **G. E. Gude, Jr.,** for the past 10 yr manager of sales for Wyatt Metal & Boiler Works, with headquarters at Houston, has been elected to the board of directors and made vice-president of the company. He will continue his position as manager of sales.

• **G. K. Wood** has been appointed manager of the Ilg Electric Ventilating Co. branch in Columbus, Ohio. Mr. Wood spent the war years as a production executive of the Cleveland Graphite Bronze Co. **A. B. Davis** has been assigned to the Ilg office in Charleston, W. Va. **Carl E. Brock, Jr.** has joined the Pittsburgh branch, and **Frank Taylor** has been assigned to the New Orleans branch. Until his affiliation with Ilg, he was structural and experimental field engineer with United Aircraft Corp.

• **J. A. Gulick** has been appointed sales representative of Titan Metal Mfg. Co., for Oklahoma, Arkansas and Northwestern Texas, with offices at Tulsa, Okla.

• **William E. Holt, Jr.** has been appointed a member of the staff of Goodall Fabrics, Inc., Detroit. For the past 6 yr, he acted as assistant to the project engineer on development for the Clifford Mfg. Co. of Boston.

• **Carl R. Tufts,** recently released from the Army, has been appointed to the Detroit staff of Baker Industrial Truck Div., Baker-Raulang Co.

• **D. B. McCoy,** general sales manager of the Steel Co. of Canada Ltd., Hamilton, Ontario, since 1943, has been appointed vice-president and general sales manager of the company.

• **Edwin K. Griest** has been appointed purchasing agent of Buckeye Iron & Brass Works, Dayton, to succeed **Edward A. Wenz,** retired.

• **James D. Miller,** senior partner of James D. Miller & Co., has been elected a director of the Sterling Engine Co., Buffalo.

• **William A. Faragher** has been named advertising director of Marco Co., Inc., Wilmington, Del. Mr. Faragher was formerly connected with McGraw-Hill Publishing Co., Philadelphia, and Aircraft Marine Products Co., Harrisburg, Pa.

• **Raymond K. Albright** has been elected chairman of the board of the Buffalo Bolt Co., North Tonawanda, N. Y. Other officers elected are: **Rudolph B. Flershem,** president; **Charles L. Turner** and **John J. McLaughlin,** vice-presidents; **S. C. Wead,** secretary and treasurer; **Charles O. Cornell,** comptroller; **Ralph B. Plumb,** assistant secretary; and **J. E. Murphy,** assistant treasurer.

• **William Balderston,** vice-president in charge of operations for the past 2 yr, has been elected executive vice-president of the Philco Corp., Philadelphia.

• **Henry F. Alfery,** general manager of the Erie Mfg. Co., Milwaukee, has been elected a member of the board of directors of the Michael Yundt Co., Waukesha, Wis.

• **Walter K. Dow,** vice-president in charge of manufacturing, American Bosch Corp., Springfield, Mass., and **William W. Baker,** works manager, have resigned. **William J. Harris** has been placed in charge of manufacturing.

• **Francis S. McMichael** has been elected a director of the Central Ohio Steel Products Co., Galion, Ohio. Mr. McMichael has recently returned to his law practice in Pittsburgh after having served 3 yr in the U. S. Navy.

WARD KEENER, vice-president for employee relations, B. F. Goodrich Co.

• **Ward Keener** has been elected to the office of vice-president for employee relations of the B. F. Goodrich Co., Akron, Ohio. In this new capacity, Mr. Keener, formerly assistant to the president, will head a new division responsible for all employee relations activities.

• **Dr. E. T. Lessig** has been named manager of textile control in the Tire Div. of the B. F. Goodrich Co., Akron, Ohio.

• **Emory F. Smith** has been appointed sales manager for Koroseal and other plastics merchandised by the International B. F. Goodrich Co., a division of the B. F. Goodrich Co.

• **Kenneth I. Silvis** has been promoted to the snap ring sales dept. of Eaton Mfg. Co., Massillon, Ohio. Mr. Silvis has been with Eaton's Reliance Div. since 1935, for the past 5 yr in the cost and payroll dept.

• **Jasper Van Opynen, Jr.** has been appointed vice-president in charge of manufacturing operations for all divisions of the Portable Products Corp., Pittsburgh. A native of Holland, Mr. Van Opynen came to this country in 1937 and in 1941 organized the Vanco Machine & Engineering Co., Holland Mfg. Co. and others in Detroit.

• **Robert G. Willaman** has been appointed sales manager and member of the board of directors of Peterson Steels, Inc., New York. Mr. Willaman was previously connected with Copperweld Steel Co. from 1940 to 1946 as New York district sales manager and before that time for 10 yr in the sales dept. of Timken Steel Tube Div. of the Timken Roller Bearing Co.

• **Campbell Wood** has been appointed works manager of Nash-Kelvinator Corp.'s Pacific Coast plant at El Segundo, Calif. Mr. Wood, who has been with Nash-Kelvinator since 1925 in various executive posts, until recently was general manager of the corporation's wartime aircraft Propeller Div. He and his staff are now headquartered at the Nash plants in Kenosha and Milwaukee. He will open offices in Los Angeles in the near future.

• **C. C. Brooks,** who was western manager of the Hoisting Machinery Div., Robins Conveyors, Inc., with his headquarters in the Chicago office of the company, has retired.

• **Kenneth D. Demarest,** formerly with the Griscom-Russell Co., has been appointed district engineer of the Fluor Corp., Ltd., in its New York headquarters.

OBITUARY...

• **David J. Harris,** 75, president of the Hewitt Metals Corp., Detroit, for the past 22 yr, died recently.

• **James Dorst,** 46, president of the Luggage Equipment & Stamping Co., Mayville, Wis., died May 15 of a heart attack.

• **Theodor Zetterlund,** 79, tool designer and head of the Zetterlund Engineering Works at Milwaukee, died May 20 after a long illness.

• **William B. Patterson,** 89, president and treasurer of the Patterson Tool & Supply Co., Dayton, until his retirement a year ago, died recently.

• **Louis S. Gabriel,** sales representative for the Philip Carey Mfg. Co., died of a heart attack in Cincinnati recently.

For extra, built-in flexibility, specify Macwhyte ATLAS Braided Slings

Fast, safe handling of your difficult loads is easy with Macwhyte ATLAS Braided Slings. Special left-and-right lay braided construction gives these slings a flexibility that enables them to grip uneven or odd-shaped objects securely. They resist kinking and spinning. To assure long life, we use our top-grade wire rope. Skilled craftsmen braid it into strong, lightweight, easy-to-use ATLAS Slings in the size, length and style you need.

Your handling problems are our chief concern. The complete line of Macwhyte Wire Rope Slings is available to fill your requirements.

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Help for your handling problems . . . Do you have these sling books?

Picture many safe ways of rigging up loads. List Macwhyte's complete line. Offer helpful suggestions. Call your nearest Macwhyte representative, or mail request to Macwhyte Company. Ask for Catalogs S-7 and 44-1.

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Kenosha, Wisconsin

Manufacturers of the CORRECT wire rope for your equipment

Left-&-Right Lay Braided Slings
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"Safe-Lock" Swaged Terminals

Mill Depots: New York · Pittsburgh
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Los Angeles; Distributors throughout the U. S. A. and other countries

NO. 806-S

MACWHYTE COMPANY 50th Year 1896 - 1946

Make MACWHYTE your headquarters for WIRE ROPE SLINGS

Dear Editor:

STEEL JOBBERS

Sir:

In the Apr. 25 issue there was an inquiry from Federal Auto Products Co., Chicago, with reference to obtaining a list of steel warehouse jobbers. Your reply did not include the name of this association. Since our association is composed of more than 50 member firms from coast to coast, I feel justified in calling your attention to the propriety of including the name of this association in answer to such an inquiry.

M. ROSOFF,
Counsel
Assn. of Steel Redistributors, Inc.,
New York

SPECTROGRAPH TECHNIQUE

Sir:

I should like very much to have duplicate tear sheets of the article "Spectrograph Technique on the Charging Floor" from the Mar. 28 issue. This information is just what I have been needing to help me officially describe the proper status of spectrographic analysis. It looks as if Mr. Rozsa has done a splendid job in this article.

WALTER J. BROOKING,
Director of Testing & Research
R. G. LeTourneau, Inc.,
Peoria, Ill.

● Two copies have been forwarded.—Ed.

ELECTROLYTIC IRON POWDER

Sir:

We notice that you quote the price of electrolytic iron powder in the Apr. 18 issue as 42¢ per lb in ton lots. At the request of Mr. Rickard of our Local Rationing Board we are writing to find out who is selling electrolytic iron powder.

C. C. CAMP,
Asst. Development Engineer
Butler Bros.,
St. Paul, Minn.

● The only large scale producer that has come to our attention is Plastics Metals, Inc., a division of National Radiator Co., Johnstown, Pa. Other operations appear to be still in the pilot plant stage and include your own subsidiary at Cooley, Minn., and National Lead Co.—Ed.

MAGNESIUM CASTINGS

Sir:

Please send tear sheets of the article "Impregnating Magnesium Castings" by Samuel A. Moore, which appeared in your issue of Mar. 14, pp. 76 to 80.

L. J. WIESCHHAUS
Market Research Engineer
American Foundry Equipment Co.
Mishawaka, Ind.

STEEL PRICING POLICY

Sir:

Will you please forward 10 reprints of "Labor Dept. Examines Consumers' Prices of Steel Products" which appears in the April 25 issue . . .

F. W. ROBERTSON
Purchasing Agent
Skelly Oil Co.,
Tulsa, Okla.

Sir:

Will you please send the writer a copy of the article on steel prices which appeared in the Apr. 25 issue?

R. L. DEILY
Development Dept.
Bethlehem Steel Co.,
Bethlehem, Pa.

Sir:

Would appreciate your sending me as soon as possible a reprint of the article "Labor Dept. Examines Consumers' Prices of Steel Products" . . .

L. H. CHRISTEN, Chief
Iron & Steel Section
Dept. of Commerce,
Washington

● The demand for the article "Labor Dept. Examines Consumers' Prices of Steel Products," which appeared in the Apr. 25 issue, has been so heavy that reprints have been made. Copies of this 36-page article are available to readers at 35¢ per copy.—Ed.

GERMAN STAINLESS STEELS

Sir:

Within the last four or five months I believe I saw an article on the comparison of German stainless steel to American. I would appreciate receiving tear sheets of the article if available.

H. O. NORDQUIST
Manager, Special Steels
Joseph T. Ryerson & Son, Inc.,
St. Louis 6

● We had an article on "German Stainless Steels" in the Dec. 20, 1945 issue, a copy of which is being forwarded to you.—Ed.

TUBE FLARING TOOLS

Sir:

In the Feb. 28 issue there is an article "Tube Flaring Tools Carboloy Tipped" which interested us very much. A Leonard precision flaring machine is mentioned. We have been unable to locate the producer of this machine and would appreciate it if you would give us the company's name.

J. E. SHROEDER
Purchasing Agent
C. C. Bradley & Son, Inc.,
Syracuse 4

● The producers of the Leonard precision flaring machine is the Leonard Precision Products Co., 1100 Larson Ave., Garden Grove, Calif.—Ed.

WAR CASUALTY

Sir:

In common with other people we suffered the misfortune of not receiving certain issues of your publication, due we presume, to sinkings during certain periods of the war. One of the issues which did not reach us was that of Nov. 18, 1943, which we understand contained an article on the manufacture of tubular railway axles. As we are very anxious to consult this article we are wondering if you could supply us with the missing copy or a reprint of the article . . .

W. B. JONES
Research Dept.
Tube Investments, Ltd.,
Birmingham, England

● Our supply of the Nov. 18 issue has been depleted, but we are forwarding a tear sheet with our compliments.—Ed.

TECHNIQUES AND TIME STUDY

Sir:

Enclosed please find my check for 60¢ for which you will please send me your booklet entitled "Techniques and Time Study—Incentives and Job Analysis."

F. W. BARNES
Bethlehem Steel Co.,
South San Francisco

ELECTRIC MOTORS

Sir:

We are manufacturing overhead gas heating units and are in the market for fractional horsepower electric motors which we do not know where to buy at present. We would greatly appreciate it if it is possible for you to submit a list of manufacturers.

M. HALPERIN
Detroit Axle Shaft Mfg. Co.,
Detroit 16

● A list of manufacturers has been forwarded.—Ed.

SMELTING IRON ORES

Sir:

In the May 9 issue of THE IRON AGE on p. 70 appeared an article entitled "Smelting Low-Grade Ores by the Krupp-Renn Process." We would like to obtain a copy of this article and would appreciate your sending it to us.

L. J. LIEBERMAN
Alan Wood Steel Co.,
Conshohocken, Pa.

● Tear sheets have been mailed.—Ed.

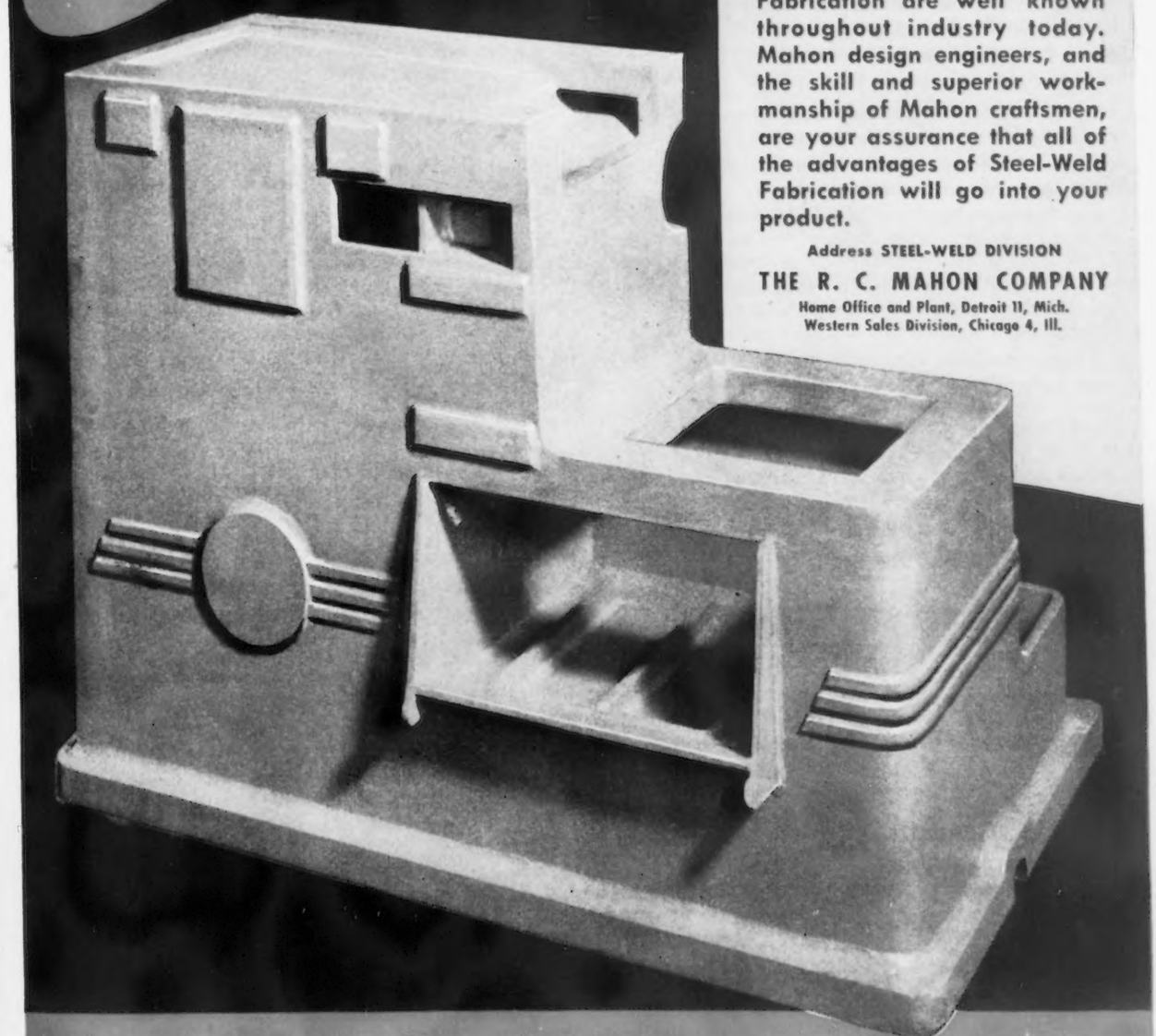
HEAT TREATING STEEL

Sir:

Would you kindly send six tear sheets of the article "Heat Treating Carburized Sintered Steel" which appeared in the Apr. 25 issue.

ALAN S. MARGOLIES,
Research Fellow
Stevens Institute of Technology,
Hoboken, N. J.

Steel-Weld FABRICATION



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MAHON

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

This Industrial Week . . .

- ***Steel Industry Comeback May Be Rapid***
- ***Ingot Rate Rises 12 Points to 56 Pct***
- ***Steel Price Increase Request Expected***

FREE from strike threats for the first time since last fall, the steel industry this week is attempting to regain lost ground and contrary to general expectations the rebound will come more quickly than even industry officials had believed. While some sources feel that the prestrike level of steel activity is from four to six weeks away, there is already evidence that the ingot output may reach 80 pct within the next three to four weeks.

Raw steel production this week jumped 12 points to 56 pct of capacity. Many mills which had cut operations because of the coal outlook last week are now using their total supplies in the hope that fresh coal will be moving to the mills by the end of this week in ever increasing volume.

While some steel companies were forced to continue at reduced activity early this week, steelmaking schedules are expected to be advanced sharply by Friday or Saturday. Output next week may jump as much as 10 points since the normal flow of coal from the mines will be in transit.

ORDER volume showed only a slight change during the past week, but after steel firms have time to revise their shipping schedules, an avalanche of fresh business is expected. Pressure is already heavy from all types of consumers for rapid delivery in order to start a much greater reconversion activity.

Most steel consumers, however, will continue to find shortages among those steel products on which the profit or return is low. This situation will tend to keep consumer inventories unbalanced for several months or until the steel industry obtains from OPA what it considers to be proper price relief.

It is a foregone conclusion that the steel industry will soon seek a general steel price increase from OPA on the basis that earlier advances were inadequate to carry the load of increased steelmaking costs. One point which will be given prominence will be the higher cost of some raw materials which steel companies mine or purchase.

The coal mine settlement will loom as a big factor in any steel price increase request, but at the same time voluminous data will be furnished on practically all steel items or at least the major proportion of them. Judging from past experience, however, it is not expected that the OPA will act quickly on the industry's request. The critical situation with respect to shortages of certain key items on which the industry is making little or no return may force the issue and bring the situation to a head faster than generally believed.

As the industry starts raising its activity to prestrike levels it will run smack into one of the worst scrap shortages experienced since peak wartime periods. Even during the time when steel production was reduced because of the coal strike, scrap supplies throughout the country were tight. Many firms which are short of pig iron because of shutdown blast furnaces turned to greater scrap charges in order to maintain output as high as possible.

MANY steel consumers who in normal times are a source of scrap for steel companies are now operating at such a low point that the flow of scrap from those sources is considerably restricted. As steel ingot output increases, firms will have to reach farther from home if a minimum supply of scrap is to be obtained. The outlook for sufficient scrap to enable mills to reach a level of activity in excess of 85 pct of capacity is so serious that it may be the one drawback in reaching such a goal.

One optimistic note which may not be sounded for at least a month is the probability that pig iron production at steel company plants will be pushed to the highest level possible. Blast furnace activity has been interfered with by strikes and coal shortages to such an extent that normal output has not been possible since early last fall.

DURING the time blast furnaces were down, however, necessary repairs were made. As these units are blown in again the stage will be set for record output. This situation, however, will not apply to some of the merchant furnaces which sell their pig iron in the open market. Many of these furnaces are shut down while operators attempt to obtain price relief from the OPA.

While it is too early to judge the possible effects of a nationwide maritime strike on the steel industry, a prolonged tieup involving Great Lakes carriers would eventually cause a shortage of iron ore. At the present time, substantial stocks of iron ore are in the hands of steelmakers and loaded at the docks. If a strike of seamen were effective on the Great Lakes, shipments of coal and ore would be stifled. A short tieup would have little or no effect upon the supply of the industry's raw material.

Steel deliveries continued to be far extended last week and most companies are expected to forego accepting 1947 business until complete revision of order books is attained. This will not inconvenience some steel consumers since they are more eager to receive material ordered some time ago than they are to worry about future requirements.

• **VACATION SHUTDOWN** — American Steel & Wire Co. closed down its cold-roll department at the company's Cuyahoga Works, Cleveland, to give employees their two-weeks vacation starting June 3. The move is a direct result of the coal strike, inasmuch as the company has no steelmaking facilities in Cleveland, and must rely upon outside source for the hot-rolled strip which is cold reduced at Cuyahoga. Inventory of semifinished material has practically disappeared and the supplier of the company is not in a position to replenish stocks due to lack of steel, according to the company.

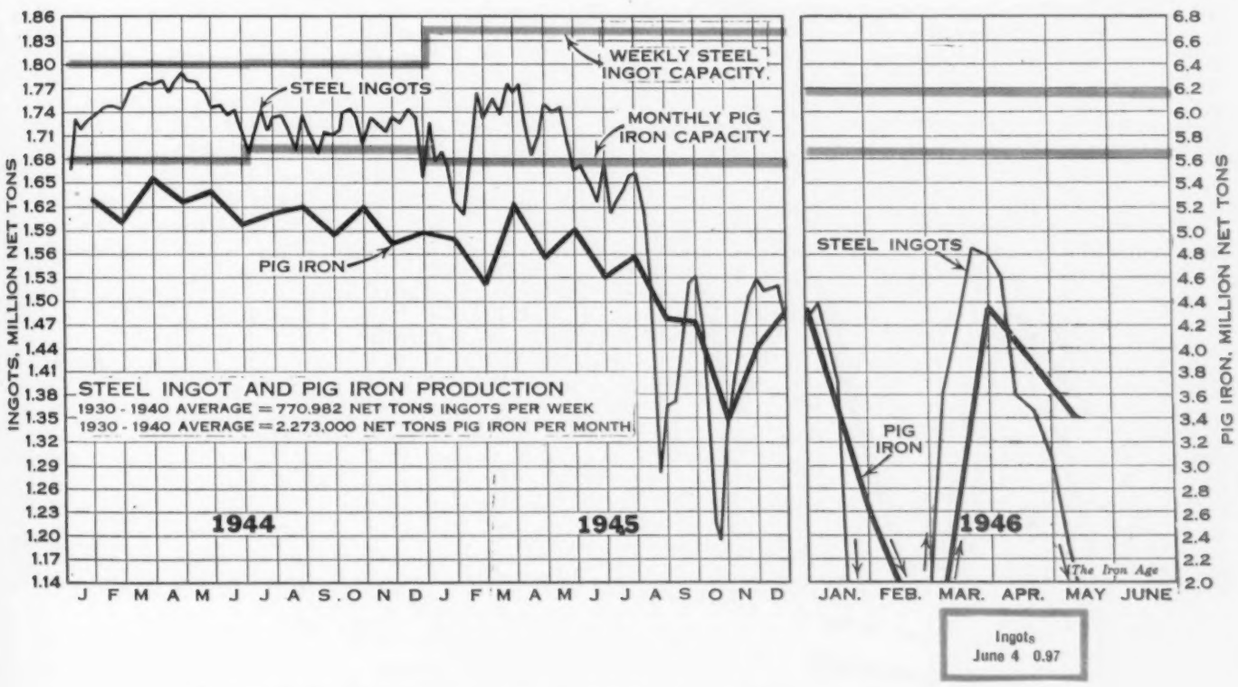
• **SOUTH AFRICAN STEEL PRODUCTION** — The South African Government has issued a White Paper on the proposed increase of $60,000,000 in the share capital of the South African Iron & Steel Corp. for the extension of the plant. It is proposed to build a new steel plant at Veerenigging with an ingot capacity of 350,000 to 390,000 tons a year, representing a capacity of 260,000 tons of the various flat-rolled products for which the steel is to be used. The planning will allow a subsequent expansion of up to about 1,000,000 tons a year, and the works at Iscor will also be extended. Today the demand in South Africa for rolled steel products exceeds local supply by at least 440,000 tons a year and is steadily growing.

• **SCRAP MARKET DEMORALIZED** — Steel scrap is becoming as scarce as foundry scrap. Many scrap dealers have lost interest in the market because they feel there is no profit for them at current ceiling prices. A number of dealers have turned their attention to the surplus steel market and are taking a profit now, although recognizing it as a short-term operation. Steel mills are openly voicing their fears for the future.

• **ANCHOR CHAIN FOR SALE**—The Maritime Commission is offering millions of feet of surplus anchor chain at much less than its original cost. All of the chain except the stud link is priced at about 4½¢ per lb. The stud link chain ranges from $38 to $691 per 90-ft shot and is subject to quantity discounts of from 20 to 40 pct. The chain is available in diameters from ⅜ to 3 in. in many lengths of wrought, cast and galvanized steel. Information may be obtained from the Materials Disposal Section, U. S. Maritime Commission, Washington 25, D. C., or any of the following Maritime Settlement Section offices: 39 Broadway, New York; 1015 Chestnut St., Philadelphia; 1212 North Lake Drive, Chicago; 348 Baronne St., New Orleans; Maritime Administration Bldg., Moore Drydock West Yard, Oakland, Cal.

• **PRODUCTION OF VEHICLES** — British production figures for March (excluding production for the Services) were: Passenger cars 12,378; commercial vehicles, including passenger service vehicles, 9618. The number of new cars and commercial vehicles exported during the same month totaled: Private cars 3271; commercial vehicles, including passenger service vehicles, 3496.

• **LEAD AND COPPER PRICES UP**—Increases have at last been granted by OPA in ceiling prices for primary, remelted and scrap lead and copper to supplement premium payments to high cost producers. Subsidy payments of $100 million for copper, lead and zinc have been approved by the Senate Banking and Currency Committee in an extension of payments for another year till June 30, 1947. New ceilings per pound are as follows for primary metal: Copper, delivered Connecticut Valley, 14.375¢; lead, delivered New York, 8.25¢. There has been no change in the ceiling price of zinc.


WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
STEEL INGOT AND PIG IRON PRODUCTION
1930 - 1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930 - 1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
1944
1945
1946
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE
The Iron Age
Ingots June 4 0.97

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
May 28	28.5	59.5	30.0	20.0	66.0*	55.0*	50.0	46.0	95.0	58.0	69.0	53.0	88.5	44.5*
June 4	37.0	63.0	61.0	56.0	72.0	75.0	60.0	56.0	100.5	58.0	70.0	59.0	97.5	56.0

* Revised

PERFORMANCE PROVES THE VALUE OF

HOUGHTON'S MAR-TEMP OIL...

for hot quenching

For distortion-free hardening within the range of 250-400° F., Mar-Temp Oil is proving most helpful, as borne out by these production reports:

SPLINE SHAFTS—When formerly quenched at room temperature these shafts had to be straightened to be within the maximum tolerance of .003". Now, quenched in Mar-Temp Oil at 350° F., distortion never exceeds .002", less than the prescribed limit.

GRINDER SHAFTS—8" long, are being carburized in salt and quenched in oil at 350° F., with less than .0005" distortion.

GEAR BLANKS of NE 8620 steel are liquid-carburized at 1675° F. for 5 hours (.050" case) and hot-oil-quenched at 350° F. Parts are cleaner than ever before, cleaning time only one-third of that formerly required.

GUIDE BARS—14" long, for a machine tool; formerly fixture-quenched, now hardened in Mar-Temp Oil at 350° F., with far less tendency to distort than when air-cooled.

Mar-Temp Oil fills a needed place in the zone between room temperature quenching and salt bath interrupted quenching above 450° F. If distortion is your problem, write for the new Mar-Temp Oil folder.

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Steel Industry Starts Recovery to Pre-Coal Strike Rate

Pittsburgh

• • • **The paralyzed steel** industry this week began its trek back to operating rates comparable to those before the coal strike. The mines went back to work in the area, and coal began moving towards the mills early this week. AFL United Mine Workers leaders and Com. George E. Slocum, U. S. Navy head of the government controlled mines in the area, expect full resumption of mining operations immediately.

The climb of steel production back to normal will be dependent entirely upon a steady and full flow of coal from the mines to the mills. Generally, coking capacities can take care of a bulge demand that will be caused by steel producers desiring to get blast furnaces into production in as short a time as possible. The main question, however, is will enough coal flow in to operate the coke ovens at full capacity?

Ed. Note: Resumption of activity in other districts which have suffered from the coal strike will follow closely the pattern at Pittsburgh.

Steel production will begin to climb just as fast as the blast furnaces begin to turn out iron. As to cold metal charges, mills here, with a few exceptions, have been using incoming scrap rather rapidly, so that not too great an increase can be expected in steel production over what will normally occur from hot metal production.

Jones & Laughlin Steel Corp. will probably be the first of those hit by the coal strike to hit normal production. Operations at J&L never fell below 50 pct during the coal strike, and their curtailment of blast furnace operations at Pittsburgh and Aliquippa occurred only when the rail strike started. All J&L's openhearths will be in operation by Friday, June 7, and the company expects to average 60 pct for the full week of June 3.

Carnegie-Illinois Steel Corp. presents an entirely different picture. Operations dropped sharply the first week of the coal strike and continued downward in this area to a low of 8.5 pct of the week of May 27. Carnegie-Illinois expects 20 pct operation this week, and will probably raise its rate rapidly following this week. Within three to four weeks, normal pre-coal strike operations should be attained. However, it is the belief of some observers in the company that steel production aimed at by the company will be greater than at any time since the end of the war. This will mean full utilization of steel making capacity, and quite probably greater utilization of capacity that has been declared obsolete and removed from the company's rated capacity estimates. Carnegie-Illinois has used some of these facilities since they were taken from the company's rated capacity, but the degree of operations anticipated will mean greater use of such equipment.

Pittsburgh Steel Co., which has had no steel production for the past couple of weeks, will likely begin steel production early next week, Monday or Tuesday. Blast furnaces will resume operation as soon as the company can get coal down and coke it.

Many producers, especially Carnegie-Illinois and Pittsburgh Steel, have sucked steel out of their inventories to the point that normal operations of finishing equipment will be dislocated for some time. While ingot production should climb back to normal by the end of June, it may take several weeks longer to get steel inventories back to the place that finishing capacity will not be held up for lack of specific types of steel.

This factor makes the steel supply situation far more critical than will be evidenced by operating rates of various companies during the coming weeks. Mill inventories determine the smoothness of operations in steel plants and directly determine the regularity and volume of shipments.

Great Lakes Picked as Probable Aid for Fontana Ingots

Chicago

• • • **Great Lakes Steel Corp.** has emerged as the probable benefactor of Henry J. Kaiser in rolling sheets from ingots produced at Kaiser's Fontana, Calif., plant for the steel hungry Kaiser-Frazer Willow Run, Mich., auto plant.

Although Mr. Kaiser has refused to disclose the name of the midwestern steel plant to which he declares he is shipping ingots for finishing, the finger is put on Great Lakes by an application to the railroads for a special low freight rate from Fontana to Detroit. Great Lakes is the only independent sheet producer with mills at Detroit.

The rate requested is $17.44 per gross ton, which compares with a present commercial rate equivalent to $33.38 per gross ton. The application cites a shortage of steel sheets and asks that the special rate be granted to meet the emergency for a temporary period of six months. The figure requested is the same as a westbound rate on skelp from Detroit to the West Coast. Shipment of ingots would be in open top cars.

Although Great Lakes reportedly has been more sympathetic than other eastern producers in receiving Kaiser's efforts to break into line on crowded sheet schedules, present apparent willingness to reach under the counter comes as somewhat of a surprise in steel sales circles.

Far from seeking new customers, the Detroit mill has made it clear to steel buyers in such districts as Milwaukee and Chicago that it is picking and choosing among clients. Delay in completing new cold-rolling facilities even has allowed Great Lakes to sell a surplus of semi-finished steel to nonintegrated mills, it is reported—a practice hardly indicative that new customers would be sought for finishing operations.

The modern version of taking coals to Newcastle will make sheets

going into the Kaiser-Frazer cars without a doubt the most costly used in automobile manufacture in modern times, even if the special freight rate is granted. The railroads already are under sharp cross fire from other steel producers to lower rates on finished steel shipments. In this light it appears probable that the Fontana-Detroit application will get fishy-eyed scrutiny to make certain that it does not open the door to a swarm of other shippers, already buzzing outside, with requests for lower rates for corresponding distances. If the Kaiser request is turned down and the present commercial rate has to be paid, the K-F automobile manufacturing cost will soar still further, probably giving the OPA auto price experts good reason to prick up their ears for an approaching customer.

Indicates Industry Will Seek General Steel Price Boost from OPA

Washington

• • • **Overall readjustment** of steel prices growing chiefly out of rising wage costs in the production of raw materials is reported to be under study in the industry. Until specific calculations have been arrived at no action will be taken but present indications are that the industry will soon ask OPA for another general steel price increase.

There are numerous elements, some of them complicated, which have to be reckoned with, but it is claimed that when combined they will warrant a further boost in prices. At present these factors are in such a state of uncertainty that the amount of the increase which probably will be sought is not known.

The principal uncertainties are the higher coal prices operators are seeking as the result of new government-made contract with UMW President John L. Lewis, and the pending price increases in iron ore and pig iron. Entering also as a factor is a new contract with higher vessel freight rates for carrying ore on the Great Lakes and the petition of railroads for a general increase in rates including raw materials for making steel. Increased rates on steel itself generally would not be an item of higher costs to producers since under the basing point system the higher freight carrying charges are passed to the consumer.

Meanwhile, what the ultimate outcome will be in the way of higher prices can be only speculative because of the complex and unsettled situation. Nevertheless, some rough estimates are being considered. Starting with coal, the 18½¢ per hr wage increase plus the 5¢ a ton for the welfare and retirement fund granted by the government to the union has been variously estimated as increasing production costs from 25¢ to 75¢ a ton. The former is the figure of Solid Fuels Administrator and the latter is that of the National Coal Assn. There is, however, a closer estimate of 35¢ to 45¢ that has been widely accepted as applying at least to steel-owned captive mines.

Taking the medium figure of 40¢, and figuring 1.4 tons of coal to one ton of coke, a yardstick commonly used, the increased cost per ton of coke would be 56¢. Further assuming 1800 lb of coke to a ton of pig iron, there is an increase of 50.4¢ in making a ton of pig iron. Then there is a pending pig iron increase, which, with the fuel price increase may be announced this week. Following soon thereafter will be a general pig iron price increase. Pig iron producers have asked for increased levels of from $2 to $5 a ton but what the actual increase will be remains to be determined. Estimates are that it will range from 75¢ to a $1 a ton, which blast furnace operators say is inadequate. But whatever the increase, approximately one-half of the rise will be added to steel costs, based on a fifty-fifty pig iron scrap charge in the steelmaking furnace. These with other costs will, it is claimed, be sufficiently substantial for steelmakers to seek a further price rise, said to be especially necessary for those who buy their own raw materials, including pig iron.

IRON OUTPUT STEEL DOWN: *After just recovering from the steel strike, pig iron output during April failed to make much headway. Indications are that official figures for May will also reflect the tightest pig iron supply situation in years.*

Blast Furnace Capacity and Production—Net Tons—Source: American Iron & Steel Institute

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
									Pct of Capacity	
			April	Year to Date	April	Year to Date	April	Year to Date	April	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	12,988,970	787,663	2,163,297	22,827	50,947	810,490	2,214,244	75.8	51.8
Pittsburgh-Youngstown	15	25,939,940	1,325,967	4,568,447	11,137	30,540	1,337,104	4,598,987	62.6	53.9
Cleveland-Detroit	7	6,557,500	411,117	1,294,541	.....	.....	411,117	1,294,541	76.2	60.0
Chicago	7	14,093,510	720,964	2,490,990	.....	.....	720,964	2,490,990	62.2	53.7
Southern	9	4,924,670	239,157	886,734	11,458	28,879	250,615	915,613	61.9	56.5
Western	5	2,836,000	83,270	315,217	.....	.....	83,270	315,217	35.7	33.8
TOTAL	36	67,340,590	3,568,138	11,719,226	45,422	110,366	3,613,560	11,829,592	65.2	53.4

Some WAA Complaints Justified MDNA Head Says But Points to Big Job

Atlantic City, N. J.

• • • **Admitting that there** were probably many grounds for complaint against the WAA, particularly on the score of slowness, Harvey Goldman, national president, Machinery Dealers National Assn., told members at their annual convention here May 29, that the entire job of surplus disposal was the largest ever attempted in the world.

It is probably 30 times as large as the sales job of General Motors which has taken many years, he said, to establish all GM sales and distribution outlets, and to train and develop highly paid and well organized personnel. WAA, on the other hand, has been hastily thrown together, and in most cases has been unable to pay salaries in any way comparable to those paid in private industry. As a result, it has had to make do with persons either imbued with a patriotic feeling, or with those of lesser abilities, Mr. Goldman argued.

Coupling these difficulties with the effects of politics and pressure groups and the large number of new people employed in the various offices, Mr. Goldman nevertheless admitted that a good start had been made. Faster clearance of paper work and prompt deliveries must be made before dealers will utilize their maximum facilities to assist in the liquidation of the huge volume of surplus machines and equipment, he said.

The Friday morning session was devoted principally to a discussion on standards, and the principal speaker, William Sharpe, stressed the need for the immediate establishment of a set of industry-wide standards for rebuilding machine tools. There have recently appeared in the industry, he said, a number of fly-by-night dealers whose sole objective is to make a large, quick profit, and who are indulging in sharp practices to make this possible. These dealers, he pointed out, are operating with little regard for ethics, and with no thought of rendering real service, and in consequence are putting on the market equipment of very poor quality. Such practices, he said, react unfavorably on the entire used machinery market.

In order to offset this, and at the same time render a service to those dealers who are not equipped to rebuild, Mr. Sharpe proposed that special rebuilding plants be set up in each district, where careful, accurate rebuilding could be performed at a minimum cost, and guaranteed to the association's own standards. Once these standards were established and accepted by industry as a whole, he believed that the affixing of a label certifying that a machine was rebuilt to MDNA standards would be sufficient guarantee of quality, and would eliminate inspection trips by dealers or customers, while at the same time effectively putting a stop to malpractice on the part of unreliable dealers.

Mr. Goldman directed the attention of the members to the fact that the government is intending to permit the buying of certain tools on a negotiated basis for rebuilding, and that one of the important terms of sale will be that the dealer must produce evidence that he is capable of rebuilding to high quality standards. The reputation of American machine tools must be maintained, he said, particularly in sales made abroad, but unless the dealers themselves establish standards there is danger that they may be expected to rebuild to tolerances even closer than those employed by the original manufacturers.

Pig Iron Made Adjustable

Washington

• • • **Adjustable pricing** provisions have been extended to producers of pig iron who now may charge and collect present ceiling prices under agreement with the buyers to pay any price increase later granted by OPA. (THE IRON AGE, May 30, p. 85.) The order became effective May 29.

A ceiling price increase of 75¢ per gross ton was granted pig iron producers in March to offset increases brought about by adjustment of steel wages. The new March ceiling also made a small allowance for other probable minor increased cost factors, according to OPA, but could not be expected to cover increases resulting from settlement of present coal-mining wage controversies.

Producers of iron ore, coal and coke were recently authorized to sell on the adjustable pricing basis. Since these products figure largely in the operation costs of blast furnaces, extension of adjustable pricing to pig iron producers became necessary to prevent hardship in the event retroactive coal increases.

SOUND THE CLAXON: *This Piper Skysedan is an all-metal 160 mph low-wing monoplane. It was designed as a family plane for the personal pilot and an all-purpose ship for the charter operator. This is one of Bill Piper's bid for the postwar airplane market.*

Completion of First Kaiser Car Indicates Increased K-F Output

Detroit

• • • **Henry J. Kaiser** drove away from the Michigan Central station in Detroit last week in the first Kaiser Special built at Willow Run thereby removing one more link in the chain of speculation associated with the introduction of the Kaiser and Frazer cars.

Automobiles are not yet being built in anything resembling quantity at Willow Run. However, completion of the first Kaiser Special coupled with the announcement that the new Frazer 1947 model will begin moving to 4000 distributors and dealers in June indicates that Kaiser's promise to give "transportation now" to prospective car buyers may be nearer to reality than many of his severest critics believe.

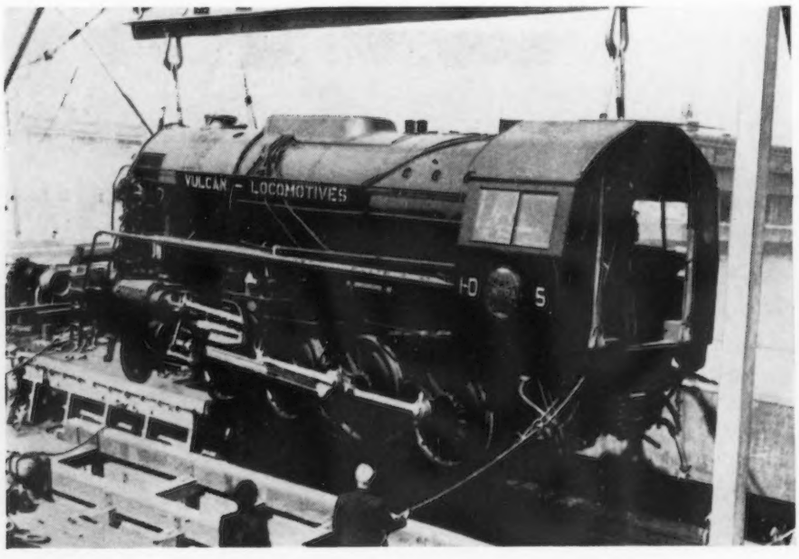
Admitting that new tooling may delay assembly line production for a considerable time, Kaiser disclosed that steel was on hand for a number of new cars and that arrangements to ship steel ingots from Fontana, Calif., for processing in the Middle West are progressing rapidly. An announcement of the purchase of facilities for breaking down and rolling ingots will be forthcoming in the near future, he said. During the interview, it was emphasized that K-F is not dependent on Fontana alone for steel and that it is unlikely that the entire surplus capacity of the Fontana plant will be used to supply K-F with ingots.

"The first shipment of ingots is scheduled to arrive here on Monday," Kaiser said. This statement was immediately changed to "arrive in the Middle West," and gave rise to the speculation that ingots produced at Fontana will be rolled at the Great Lakes plant in Detroit. Great Lakes is reported to have excess rolling capacity at the present time and the fact that such an arrangement would virtually eliminate further hauling once the steel is rolled into sheets gives weight to the argument that Great Lakes is one of the plants being considered as processing centers for steel ingots produced at Fontana.

That K-F is seriously considering the possibilities of aluminum bodies is indicated by the fact that 300 engineers are working independently of Willow Run on this subject. A considerable amount of technical progress in this field of aluminum application was reported. In addition, Kaiser emphasized the fact that while the recent increase in the cost of coal will undoubtedly be reflected in higher prices for steel, the price of aluminum which is produced by hydroelectric power will not be similarly affected. In his opinion, aluminum and steel will shortly become more competitive as to price than they have been in the past.

The possibilities of using plastics in automobile construction is also being investigated by K-F. Plastic bumpers claimed to have much better impact properties than steel are now being tested at Willow Run, it was said. While K-F does not look for all-plastic bodies in the near future, the possibilities of combining plastics and aluminum for certain automotive parts is receiving serious attention.

LOCOMOTIVES ABROAD: *Here is one of Great Britain's "Liberation" locomotives built for UNRRA. A total of 30 are being shipped to various European countries.*



Pig Iron Output Dips To 61.6 Pct of Rated Capacity During April

Toronto

• • • **Shortage of soft coal** due to the U. S. strike, which made it necessary for blast furnace operators to curtail operations was reflected in reduced output of pig iron in Canada during April. For April pig iron production totaled 142,240 net tons or average rate of 61.6 pct of rated capacity and compares with 67.5 pct in March. Output for the month under review included 119,557 tons of basic iron; 12,233 tons of foundry iron and 10,460 tons of malleable iron.

Blast furnace charges in April included 260,600 tons of iron ore; 15,912 tons of mill cinder, scale and sinter, and 6157 tons of scrap iron and steel.

In the four months ended with April, pig iron production totaled 587,032 net tons, compared with 627,343 tons in the corresponding period of 1945 and 612,417 tons in 1944.

Production of ferroalloys in April rose to 13,083 tons, against 8405 tons in the previous month and compares with 18,350 tons in April, 1945. Output included ferrosilicon, silicomanganese, ferromanganese, ferrochrome, Chrom-x and ferrophosphorus. In the first four months this year output of ferroalloys totaled 43,238 net tons compared with 60,316 tons in the same period of 1945 and 57,460 in 1944.

Following are comparative monthly production totals in net tons:

	Pig iron	Ferroalloys
Jan.	143,685	10,878
Feb.	143,171	10,872
Mar.	158,049	8,405
Apr.	142,240	13,083
Total	587,032	43,238

Hanna Co. to Explore Undeveloped Deposits of High Grade Ore in Brazil

Cleveland

• • • **Plans for exploring** large and hitherto undeveloped deposits of high grade iron ore outcrops in the Brazilian territory of Amapa, north of the Amazon River, have been disclosed here by Hanna Exploration Co., an M. A. Hanna Co. subsidiary.

This followed the announcement in Rio de Janeiro that Capt. Janary Gentil Nuneg, Governor of Amapa, acting with the approval of President Eurico Gaspar Dutra and other Brazilian government officials, had granted M. A. Hanna Co. interests an option for a long-time lease to mine the Amapa ore and to build a 75-mile railroad from the ore deposits to the city of Macapa, capital of Amapa, on the northernmost mouth of the Amazon.

According to Hanna officials, the venture will depend upon the results of an exploratory drilling campaign to be undertaken immediately under the direction of three members of the Hanna organization. They are A. E. Walker, geologist of Iron River, Mich., and two engineer-geologists, C. M. Harrer, Iron Mountain, Mo., and John Owens, Hibbing, Minn. They left Miami, by plane May 21 for Belem, Para, Brazil, and from Belem flew across the Amazon to Macapa and are now at the property. The contract for the exploratory drilling has been let to Sprague & Henwood of Scranton, Pa., and actual work will start as soon as the equipment can be delivered to the deposits.

George M. Humphrey, president, M. A. Hanna Co., said that about a year of intensive work must be done on the property before his company can decide whether the operation will justify the large capital expenditures required for installing mining equipment and building the railroad and dockage facilities at Cacapa, where the ore would be offered for sale to the markets of the world. If the decision should be made to go ahead with the project, the Hanna Exploration Co. will organize a Brazilian company to do the construction work, he said.

The Amapa ore deposits, which geologists believe may possibly contain extremely large tonnages of high quality ore recoverable by open pit mining, lie in the district of Santa Maria and can be delivered to deep water with a relatively short rail haul.

Until a few years ago Amapa, a tropical wilderness lying directly north of the equator, was a part of the state of Para of the United States of Brazil. During World War II its potential importance as the northern bastion of the mouths of the Amazon was recognized by the Brazilian government and it was made a separate territory.

National Tube Co. Buys Portion of Gary Plant

Gary, Ind.

• • • **C. R. Cox,** president of the National Tube Co., U. S. Steel subsidiary, today announced the purchase from the Reconstruction Finance Corp. of a portion of the facilities acquired and installed for the government during the war by the Tubular Alloy Steel Corp. in its Gary plant.

Mr. Cox said the purchase price was $4,775,000 and that the purchase covered facilities adaptable for production of peacetime products with the balance to be removed from the plant by Reconstruction Finance Corp. The original cost of all the facilities installed for the government was approximately $12,282,000.

It is understood that the purchase of equipment in the plant by National Tube is an integral part of an improvement program for production of carbon and alloy mechanical, and pressure tubing. Completion of the program will result in increased employment, according to Mr. Cox.

During the war, the Gary plant produced millions of feet of seamless alloy tubing of the type used in aircraft, tanks and refineries.

Portable Tool Prices Rise

Washington

• • • **Manufacturers of portable** power driven tools have been given an interim 12 pct price increase, effective June 1, OPA has announced. Largely sold direct from maker to consumer, wherever sales are made by resellers the increase may be passed on.

Drills, hammers, saws, wrenches and chisels of the type used mainly by industrial consumers are the main tools affected by the order. Price levels have not been substantially changed since frozen in 1941 and the present increase has been granted to adjust increased steel and labor costs while OPA is making a survey to determine the price increase it believes industry is entitled to.

NO SHORTAGE HERE: *Two-wheelers appear to be the symbol of British means of establishing exchange abroad. Here are thousands of bicycles from Nottingham awaiting shipment to world markets.*

Suspension of All War Shipments Causes Drop In Canadian Exports

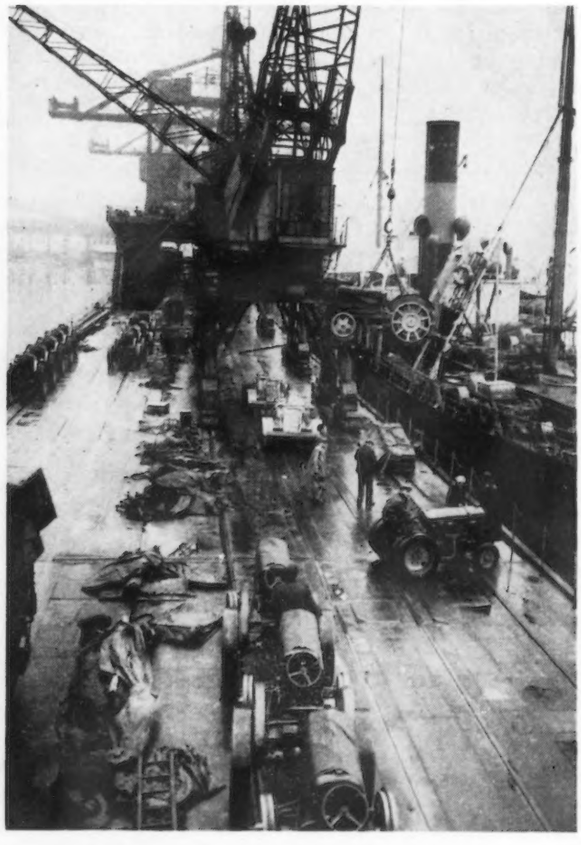
Ottawa

• • • **Canadian exports for** the month of April dropped to a value of $178,488,000 from $312,323,000 in April 1945, according to the Dominion Bureau of Statistics. The decline in merchandise exports was chiefly due to the suspension of shipments of war materials. For the first four months of this year exports had a total value of $699,098,000 compared with $1,080,360,000 in the corresponding period of 1945.

Exports to Great Britain, the United States, India, Italy and Russia declined sharply, but shipments showed gains to Belgium, the Netherlands, Czechoslovakia, Norway, Portugal and Yugoslavia and there was a general advance in trade with Central and South America.

Exports to the United Kingdom in April were valued at $40,974,210 compared with $109,090,774 in April last year; to the United States, $71,399,250 against $109,121,234; to British India $2,301,469 against $29,138,161; to Italy, $2,816,515 against $14,731,429 and to Russia, $203,615 compared with $6,223,028 in April last year. April shipments to Belgium totaled $5,387,342 compared with $269,790 in the same month last year; Czechoslovakia, $3,279,561 against $155,061; the Netherlands, $1,711,550 against $271,808; Norway, $1,200,596 against none last year; Poland, $2,630,935 against $466,966 and Yugoslavia, $2,514,788 against $400,500 in April a year ago. Exports to France declined slightly to $7,584,976 compared with $8,500,625. In South America largest increases were recorded in exports to Argentina at $948,025 against $484,221; Brazil, $1,713,927 compared with $1,012,807; Colombia, $891,494 against $332,049, and Venezuela, $881,829 against $317,192.

Exports in the iron and steel group declined sharply from $68,419,000 to $18,939,000 in April 1945, due chiefly to the decrease in automobile and parts from $43,688,000 in April 1945 to $8,889,000 in the same month this year. Exports of nonferrous metals and their products were valued at $21,849,000 compared with $36,426,000. Chemicals and allied products at $5,577,000 compared with $12,685,000 and miscellaneous commodities at $5,484,000 compared with $50,171,000.



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TRACTORS FOR DENMARK: *Great Britain continues its export activities with a shipment of Ford Motor tractors to Denmark. The Ford company in England is working at full speed on exports, which for March were the highest for Great Britain since the end of the war.*

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Machine Tool Exports Lag

London

• • • **American machine** tool exporters are suffering the same fate that steel exporters have noted, with a large proportion of the Continental business going to British machine tool firms. Some estimates by Americans here indicate that tool orders are going to Britain at a rate of 4-1.

Slow deliveries and out-of-date methods of payment are thought to be the two outstanding reasons for the preponderance of British orders. British producers estimate that about 60 pct of their current production is being delivered outside the United Kingdom. The British government policy of offering war surplus tools first to British manufacturers is contributing to this figure. Under the disposal plan the war tools are being offered at low prices to British firms and the left overs go at a higher figure to foreign firms.

NHA Praises New Material

Washington

• • • **A new lightweight** structural material, fabricated from aluminum and plastics, is expected to be placed into production within three months, it was reported here recently.

A wartime development by the Virginia Lincoln Corp. for protection of radar equipment of military aircraft, its developers have turned to adapting it for peacetime structural purposes such as flooring, walls, doors, and roofing.

It is regarded by the National Housing Administration as one of the most promising of many new developments trotted out for inspection of NHA under the guaranteed market provisions of the Emergency Housing Act. Housing Administrator Wyatt and NHA technical experts recently made a flying trip to Marion, Va., to look over the new product.

Weekly Gallup Polls . . .

Public Thinks Continuance of OPA Essential

Princeton, N. J.

• • • **The American people** are overwhelming in their approval of keeping ceiling prices on food, rent, clothing, and on automobiles, radios, and other manufactured articles for the next year, according to George Gallup, director, American Institute of Public Opinion.

They feel the way they do because they believe that price controls will keep prices lower during the next year than they would be if ceilings were removed.

But there is an important qualification in their thinking. The great majority endorse the idea of putting prices high enough to allow the manufacturer to make a profit.

A majority also believe that in some cases prices are not high enough for the manufacturer to make a profit at the present time.

These facts emerge from questioning by field reporters for the institute in all parts of the country on the issue of OPA and price controls.

The questions asked, with replies:

(1) "For the next year would you like to have OPA price ceilings kept on or taken off the following: Food? Rent? Clothing? Automobiles, radios, and other manufactured goods?"

The vote:

	Keep Price Ceilings Pct	Remove Price Ceilings Pct	No Opinion Pct
Food	75	21	4
Rent	78	17	5
Clothing	70	26	4
Automobiles, radios and other mfd. goods	66	27	7

(2) "A year from now, which way do you think prices would be lower—if OPA is done away with now, or if it is kept on?"

Prices lower if OPA:

	Pct
Done away with	21
Is kept on	68
No opinion	11

(3) "Do you think OPA price ceilings make it impossible for some manufacturers to make a profit?"

	Pct
Yes	51
No	35
No opinion	14

(4) "Should OPA put high enough ceilings on products to allow manufacturers to make a profit?"

	Pct
Yes	84
No	9
No opinion	7

The above question does not, of course, deal with opinion about whether profits are or are not being made under present conditions; it concerns itself only with what the public thinks about the right of manufacturers of U. S. to make a profit.

This, of course, applies to manufacturers in general. It should not be interpreted to mean that each manufacturer, no matter how inefficient, should be permitted to make a profit.

•

• • • **While the American** people are not inclined to be sympathetic toward the Spanish Government headed by Franco and oppose letting Spain become a member of the UNO, they are evenly divided on the issue of whether the United States should go so far as to break off diplomatic relations with Spain.

This report from the American people through the medium of the institute comes at a time when a special committee of the United Nations is attempting to weigh the Polish government charge that Spain under Franco constitutes a threat to world peace.

The question used in measuring public sentiment in this country toward breaking off with Spain is this:

"Do you think we should or should not break off diplomatic relations with Spain?"

	Pct
Should	43
Should not	43
Undecided	14

When the replies are analyzed on the basis of the political preferences of those with whom field reporters talked, definite differences in thinking between Republicans and Democrats show up.

Majority Would Keep Price Ceilings for Another Year At Level to Insure Profit

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A majority of Republicans think relations with Spain should not be broken, the weight of opinion among the Democrats is just the opposite, approving a break with Spain.

Here is a table giving the vote of 1944 Dewey and Roosevelt voters on the question:

	Should Pct	Should not Pct	Undecided Pct
Democrats	49	35	16
Republicans	36	52	12

The arguments which people say can be given in favor of breaking off with Spain are:

(1) Spain is harboring Nazis and German scientists.

(2) The Franco government is a Fascist government.

(3) Spain aided the Axis during the war.

(4) Spain is a menace to world peace.

The arguments which people say can be given against breaking off relations with Spain:

(1) We have to have a united world, with everyone friendly toward everyone else.

(2) Breaking off relations with Spain might mean another war.

(3) We should not interfere with Spain's internal affairs.

(4) Spain is not endangering world peace or giving any provocation for a diplomatic break.

(5) It would hurt trade with Spain.

(6) Russia would have her way again.

(7) It might cause civil war in Spain.

(8) We would not know what is going on in Spain.

In August 1945, the institute

[CONTINUED ON PAGE 168]

Consumption Figures Indicate Steel Has Held Its

New York

• • • **The use of steel** in important consuming industries has kept pace with the growth of those industries during the past 20 yr. This is indicated by comparisons of estimated steel consumption in various industries with production (or representative indices of production) in those industries, shown in the accompanying tables annually since 1926. In general, the consumption of steel in each industry has paralleled closely its growth during the period, and there is no evidence of any displacement in the use of steel.

The data of steel distribution by consuming industries are those which have already appeared in THE IRON AGE, revised for the earlier years to put them on a comparable basis with the later figures. Data showing production in the various consuming industries have been taken from a number of sources.

Some idea of the relative importance of the various markets for steel can be gained from the data for 1937, which might be considered a fairly normal prewar year. In that year, the proportion of total steel output that went into different industries was as follows: Automobiles, 19 pct; construction, 15 pct; railroads, 11 pct; containers, 8 pct; oil, gas, water and mining, 7 pct; agriculture, 6 pct; machinery and tools, 4 pct; furniture, 4 pct; shipbuilding, 1 pct; exports, 7 pct; miscellaneous, 18 pct. Let us consider these markets in their prewar order of importance.

In the automobile industry, steel consumption has shown a trend at least as good as as the total production for both passenger cars and trucks. In fact, the amount of steel used per automobile produced has shown a tendency to rise, reflecting the trend toward larger (and therefore heavier) cars in recent years. The average number of tons of steel per automobile rose from about 1.5 in 1926 to about 1.7 before the war. The latter figure, equivalent to 3400 lb of steel is now considered in the automobile industry as a normal average. Of course, dividing the tonnage of steel by automobile output does not necessarily give the exact figure each year, because of inventory adjustments and the time lag between the production of steel and automobiles, but it does show the trend over a period of years.

In the building industry, most of the steel used has gone into nonresidential construction, and only a minor fraction into residential structures. The amount of nonresidential construction has therefore been selected for comparison with steel consumption in the building trades, and the resulting relationship found to be remarkably constant. The tonnage of steel per 1000 sq ft of nonresidential construction has remained between 20 and 40 each year since 1926. This is surprising, considering the nature of the unit of construction used for comparison, the wide fluctuations in construction activity from year to year, and the time lag involved.

In the railroad industry, the tonnage of steel used has shown a definite decline since 1926, but no more of a decline than gross capital expenditures of the railroads. Here, again, the relationship has been surprisingly constant, when allowance is made for year-to-year variations arising from inventory and other factors. Tons of steel used per $1000 capital expenditure of the railroads has remained between 6 and 12 in all but three of the past 20 yr. The decline in consumption of steel by the railroads has been due entirely to a lower level of expenditures in that industry and not to any displacement of steel. If capital expenditures of the railroads could be raised to the 1926 level, the evidence indicates that they

Containers

	Steel Consumed (thousands net tons)	Tin Can Production* (millions of cans)	Tons of Steel Per Million Cans
1945	3,959	.....	...
1944	3,878	.....	...
1943	4,301	.....	...
1942	4,071	.....	...
1941	4,612	.....	...
1940	3,068	.....	...
1939	2,978	16,129	185
1938	2,137	.....	...
1937	3,219	16,216	199
1936	2,750	.....	...
1935	2,284	12,595	180
1934	1,744	.....	...
1933	1,970	10,021	197
1932	1,161	.....	...
1931	1,585	9,409	168
1930	1,870	.....	...
1929	1,912	10,150	189
1928	1,813	.....	...
1927	1,577	8,065	196
1926	1,510	.....	...

* Bureau of the Census.

Oil, Gas, Water and Mining

	Steel Consumed (thousands net tons)	Steel Consumed Index (1935-39 Average = 100)	Oil and Gas Wells Drilled* (thousands)	Wells Drilled Index (1935-39 Average = 100)
1945	2,670	121	26.9	99
1944	2,464	112	25.3	93
1943	1,903	86	19.4	72
1942	1,586	72	19.8	73
1941	2,929	133	32.1	118
1940	1,900	86	30.0	111
1939	1,842	84	27.7	102
1938	1,820	83	27.5	101
1937	3,034	138	33.1	122
1936	2,684	122	25.9	96
1935	1,608	73	21.4	79
1934	1,437	65	18.2	67
1933	1,142	52	12.3	45
1932	718	33	15.0	55
1931	1,723	78	12.4	46
1930	3,240	147	21.2	78
1929	4,117	187	26.4	97
1928	3,191	145	22.3	82
1927	3,256	148	24.1	89
1926	3,974	180	29.3	108

* American Petroleum Institute.

Ground During Past 20 Years

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By JOSEPH V. SHERMAN

o o o

would consume as much steel as in that year.

In the case of metal containers, there has been an almost steady increase in consumption of steel, but data showing the number of tin cans produced are available only for the census years through 1939. For the seven census years between 1927 and 1939, tons of steel used per million cans produced was relatively constant; it remained between a low of 168 and a high of 199. Since 1941, metal can production has been reported by the government only in terms of tons of steel consumed, so that the comparison made through 1939 cannot be carried out for the later years.

The oil, gas, water and mining industries are too diverse to permit the use of an overall index of production for comparison with steel conssmption. However, the number of oil and gas wells drilled has been used for this purpose, since it represents one of the important outlets for steel in these industries, and data are available over a period of many years. Data for both steel consumption and oil and gas wells drilled have been compared on the basis of indices, taking the 1935-39 average equal 100. The results show that generally steel consumption in these industries has kept pace with the number of oil and gas wells drilled, and in recent years has shown a better trend.

Steel consumption in the machinery and tools industry has also generally kept pace with machinery production. With the exception of three war years, the two series have closely paralleled each other since 1926. In 1945, again, the two indices were practically the same.

The use of steel in agriculture has been compared with the value of farm equipment manufactured. However, this basis of comparison is not entirely satisfactory, since the value of farm equipment involves a price as well as a tonnage factor. Also, farm equipment includes many different types of products accounting for varying proportions of sales each year. Nevertheless, the number of tons of steel used per $1000 value of farm equipment manufactured has remained within reasonable limits. Over the period covered, it

Machinery and Tools

	Steel Consumed (thousands net tons)	Steel Consumed Index (1935-39 Avg. = 100)	Machinery Production Index* (1935-39 Avg. = 100)
1945	4,739	345	343
1944	3,270	236	433
1943	3,275	238	443
1942	2,852	208	340
1941	3,316	215	221
1940	2,330	170	136
1939	1,460	106	104
1938	831	61	82
1937	1,804	131	126
1936	1,680	122	105
1935	1,091	80	83
1934	825	60	69
1933	782	57	50
1932	441	32	43
1931	791	58	66
1930	1,342	98	100
1929	2,028	148	130
1928	1,805	132	106
1927	1,170	85	99
1926	1,273	93	102

* Federal Reserve Bulletin.

Construction

	Steel Consumed (thousands net tons)	Non-Residential Construction* (millions of square feet)	Tons per 1000 sq. ft.
1945	8,353	286	29
1944	6,240	156	40
1943	6,640	245	27
1942	10,715	848	13
1941	10,221	440	23
1940	6,936	268	26
1939	6,100	180	34
1938	4,398	188	23
1937	6,038	210	29
1936	6,468	187	35
1935	4,315	117	37
1934	3,556	88	40
1933	2,961	74	40
1932	2,692	82	33
1931	4,589	176	26
1930	7,355	280	26
1929	8,643	403	21
1928	7,907	399	20
1927	7,781	356	22
1926	7,027	363	19

* F. W. Dodge Corp.

Railroads

	Steel Consumed (thousands net tons)	Gross Capital Expenditures* (millions)	Tons Per $1000 Capital Expenditure
1945	5,268	$563	9.4
1944	6,134	560	11.0
1943	5,172	454	11.4
1942	4,400	535	8.2
1941	5,983	543	11.0
1940	4,019	429	9.4
1939	3,250	262	12.4
1938	1,444	227	6.4
1937	4,686	510	9.2
1936	4,082	299	13.6
1935	1,961	188	10.4
1934	2,544	213	12.0
1933	1,475	104	14.2
1932	1,176	167	7.0
1931	3,035	362	8.4
1930	5,240	873	6.0
1929	8,163	854	9.6
1928	6,853	677	10.1
1927	6,980	772	9.0
1926	8,575	885	9.7

* "Railway Age" Assn. of American Railroads.

Agriculture

	Steel Consumed (thousands net tons)	Farm Equipment Manufactured* (millions)	Tons Per $1000 Value
1945	2,095	.....	...
1944	1,951	$1,081	1.8
1943	1,462	614	2.4
1942	1,166	647	1.8
1941	1,683	653	2.6
1940	1,630	497	3.3
1939	1,421	416	3.4
1938	1,110	444	2.5
1937	2,335	524	4.5
1936	2,338	443	5.3
1935	1,976	302	6.5
1934	1,233	N.R.	...
1933	1,109	N.R.	...
1932	605	N.R.	...
1931	1,350	190	7.1
1930	1,709	467	3.7
1929	3,061	552	5.5
1928	2,978	...	...
1927	1,987	...	...
1926	2,020	...	...

N.R.—not reported
* Bureau of the Census

Steel Consumption and Industrial Production

	Steel Consumed (thousands net tons)	Steel Consumption Index (1935-39 Avg. = 100)	Industrial Production Index* (1935-39 Avg. = 100)
1945	55,692	165	202
1944	63,846	189	235
1943	63,400	188	239
1942	62,446	185	199
1941	62,324	185	162
1940	48,660	145	125
1939	39,068	116	109
1938	23,569	70	89
1937	41,178	122	113
1936	37,858	112	103
1935	26,840	80	87
1934	21,246	63	74
1933	18,743	56	69
1932	11,705	35	58
1931	21,477	64	75
1930	33,055	98	91
1929	45,998	137	110
1928	42,182	125	99
1927	36,825	109	95
1926	39,755	118	96

* Federal Reserve Bulletin.

Automobiles

	Steel Consumed (thousands net tons)	Automobile Production* (thousands)	Tons of Steel Per Automobile
1941	9,847	4,839	2.03
1940	7,965	4,469	1.78
1939	5,906	3,577	1.65
1938	4,053	2,489	1.63
1937	7,814	4,809	1.62
1936	7,517	4,454	1.69
1935	6,738	3,947	1.71
1934	4,593	2,753	1.67
1933	3,954	1,920	2.06
1932	2,088	1,371	1.52
1931	3,527	2,390	1.48
1930	4,935	3,356	1.47
1929	7,353	5,358	1.37
1928	7,799	4,359	1.79
1927	5,482	3,401	1.61
1926	6,144	4,301	1.43

* Automobile Manufacturers Assn.

averaged about four tons of steel for each $1000 value of farm equipment.

The above-mentioned industries accounted for about 75 pct of total steel consumption before the war. Major portion of the balance went into many miscellaneous uses which it would be difficult to trace. However, it is known that a number of the miscellaneous uses of steel have shown rapid growth in recent years.

Perhaps the best proof that steel has held its ground during the past 20 yr is afforded by comparing the index of total steel consumption with that of industrial production. Up until 1942, the two series have been quite parallel. The divergence during the war years is not considered significant because of wartime factors that affected industrial production. Other materials were used in place of steel during the war, only where sufficient steel was not available.

British Tinplate Men Get Guaranteed Week

London

• • • **Agreement on a guaranteed** week for tinplate workers and an understanding on a changeover from 8 to 6-hr shifts in the mills has been reached following negotiations by special committees of the Joint Industrial Council of the British tinplate trade.

This agreement followed a suggestion made by the government, when announcing its intention to release the trade from the provisions of the Essential Work Order, that labor and management should get together during the intervening period and try to hammer out mutual arrangements as to future conditions.

A15-10

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS
Period MARCH - 1946

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons *	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) Total *	To Date This Year: Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	37	1	xxxx	xxxx	xxx	556,610	178,262	xxxx	xxx	722,465	354,128
Structural shapes (heavy)	12	2	9,421,550	334,290	43.5	326,787	xxxx	584,998	26.3	604,388	xxxx
Steel piling	4	3		14,230		11,972	xxxx	25,681		21,283	xxxx
Plates (sheared and universal)	27	4	17,080,770	430,113	29.6	396,538	25,862	793,034	18.8	767,639	56,073
Skelp	5	5	xxxx	xxxx	xxx	49,965	22,378	xxxx	xxx	82,557	31,912
Rails—Standard (over 60 lbs.)	4	6	3,657,000	179,591	57.8	167,889	xxxx	307,082	34.0	301,538	xxxx
—All other	5	7	392,000	10,036	30.1	9,310	xxxx	26,835	27.8	24,882	xxxx
Splice bars and tie plates	12	8	1,745,960	61,683	41.6	67,449	xxxx	113,899	26.4	123,846	xxxx
Track spikes	10	9	349,400	12,029	40.5	13,791	xxxx	25,446	29.5	27,725	xxxx
Hot Rolled Bars—Carbon	33	10	xxxx	666,081	xxx	530,207	76,225	1,269,453	xxx	1,050,787	144,173
—Reinforcing—New billet	14	11	xxxx	83,432	xxx	90,182	xxxx	156,365	xxx	176,959	xxxx
—Rerolled	12	12	xxxx	14,558	xxx	13,814	xxxx	27,803	xxx	27,619	xxxx
—Alloy	22	13	xxxx	129,777	xxx	99,650	10,914	268,645	xxx	217,286	22,432
—Total	39	14	21,906,660	893,848	48.0	733,853	87,139	1,722,266	31.9	1,472,651	166,605
Cold Finished Bars—Carbon	24	15	xxxx	113,717	xxx	110,877	xxxx	246,022	xxx	246,282	xxxx
—Alloy	23	16	xxxx	17,301	xxx	15,466	xxxx	39,036	xxx	34,189	xxxx
—Total	31	17	2,841,510	131,018	54.3	126,343	xxxx	285,058	40.7	280,471	xxxx
Tool steel bars	18	18	255,010	10,421	48.1	9,067	xxxx	22,026	35.0	21,346	xxxx
Pipe & Tubes—Butt weld	14	19	2,176,520	128,538	69.5	106,582	xxxx	245,378	45.7	240,905	xxxx
—Lap weld	9	20	730,200	27,833	44.9	26,841	xxxx	47,378	26.3	54,971	xxxx
—Electric weld	10	21	1,536,900	50,247	38.5	39,302	xxxx	128,091	33.8	108,743	xxxx
—Seamless	13	22	3,169,600	224,675	83.4	214,011	xxxx	380,390	48.7	347,208	xxxx
—Conduit (cap. & prod. incl. above)	5	23	xxxx	xxxx	xxx	6,724	xxxx	xxxx	xxx	15,908	xxxx
—Mech. tubing (cap. & prod. incl. above)	11	24	xxxx	xxxx	xxx	24,491	xxxx	xxxx	xxx	73,205	xxxx
Wire rods	25	25	7,293,670	393,838	63.6	99,194	33,402	783,781	43.6	203,009	74,361
Wire—Drawn	39	26	5,708,890	294,877	60.8	164,285	12,587	608,846	43.2	348,767	24,454
—Nails and staples	18	27	1,260,360	50,049	46.7	48,523	xxxx	101,378	32.6	99,416	xxxx
—Barbed and twisted	15	28	543,610	19,621	42.5	18,943	xxxx	40,742	30.4	39,292	xxxx
—Woven wire fence	15	29	1,121,860	34,711	36.4	35,125	xxxx	76,380	27.6	76,196	xxxx
—Bale ties	12	30	149,700	6,563	51.6	6,833	xxxx	13,485	36.5	14,866	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	69,372	231	xxxx	xxx	164,471	561
—Chemically treated	8	32	465,000	14,240	36.0	13,186	xxxx	30,852	26.9	28,574	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,758,850	161,558	50.6	178,605	xxxx	314,307	33.9	361,079	xxxx
—Electrolytic	9	34	2,231,850	72,861	38.4	70,315	xxxx	142,732	25.9	154,775	xxxx
Sheets—Hot rolled	30	35	19,353,320	1,210,885	73.6	530,865	47,295	2,445,824	51.2	1,058,292	81,772
—Cold rolled	13	36	7,127,460	435,117	71.9	311,685	xxxx	1,000,464	56.9	711,017	xxxx
—Galvanized	16	37	2,924,130	132,235	53.2	128,696	xxxx	278,863	38.7	280,767	xxxx
Strip—Hot rolled	25	38	7,180,030	228,925	37.5	141,314	23,919	448,256	25.3	301,640	46,171
—Cold rolled	34	39	3,067,510	108,333	41.6	105,892	xxxx	237,910	31.4	241,441	xxxx
Wheels (car, rolled steel)	5	40	315,400	22,261	83.1	21,695	xxxx	45,896	59.0	45,664	xxxx
Axles	6	41	398,170	12,522	37.0	12,505	xxxx	22,923	23.3	21,481	xxxx
All other	3	42	169,510	4,225	29.3	430	xxxx	9,422	22.5	3,780	xxxx
TOTAL STEEL PRODUCTS	140	43	xxxx	xxxx	xxx	4,644,988	431,075	xxxx	xxx	9,446,288	836,057
Effective steel finishing capacity	140	44	64,059,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	140	45	xxxx	xxxx	xxx	77.4 %	xxxx	xxxx	xxx	54.5 %	xxxx

During 1945 the companies included above represented 98.4% of the total output of finished rolled steel products as reported to American Iron and Steel Institute.

The London ECONOMIST

One World or Two?

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

o o o

THE Foreign Ministers have dispersed, and another round in the long and inconclusive diplomatic struggle has come to an end. Superficially it resembled all its predecessors. The discussions turned primarily on the familiar topics—the exclusive nature of Soviet control over the "Russian one" in Eastern and Central Europe. And these topics led, as usual, to deadlock. But the Conference was nevertheless very different from the earlier London and Moscow meetings. Something new and decisive emerged at Paris—a vigorous diplomatic lead from the United States.

In recent months American policy has shown signs of gathering momentum in every sphere of international relations. It is an open secret that the delays over a possible loan to Russia are mainly political. The State Department has also suspended the $90 million loan already negotiated with Poland on the grounds that the country's internal regime is undemocratic. It is widely believed that the Communist defeat in the referendum on the French constitution eased M. Léon Blum's negotiations in Washington. This activity provided the background to the Paris Conference, and all that Mr. Byrnes did and said confirmed the conclusion that the activity was not haphazard but part of a wide American "peace offensive" designed to bring the soldiers home and get European conditions back to "normal." So long as Soviet troops remain in occupation in Eastern Europe, it is hazardous to withdraw American and British troops. So long as Russian control remains uncontested along the Danube, there is little hope for American trade expansion. The desire to reduce and withdraw troops and to open up the economic life of Europe ran through most of Mr. Byrnes' proposals—and it is significant that, apart from the British plan for settling the Italian colonies, all the new suggestions at Paris came from Mr. Byrnes. He proposed, as a means of reducing the armies of occupation at some future date, a Four Power Treaty for armament control in Germany. He proposed, again in part as a method of removing the soldiers, a final settlement and treaty with Austria, arguing that the conclusion of a peace would enable all armies to be withdrawn, in which case Russia would not need to "guard its lines of communication" across Rumania and Hungary. He opposed the inclusion of Trieste in Jugoslavia, on the grounds that the Jugoslavs were part of a closed economic system; he advocated instead that, while the town of Trieste should remain in Italy, its port should be internationalized and serve a "free"Danubian hinterland. He also attempted to secure clauses in the Balkan treaties guaranteeing this commercial freedom.

Mr. Byrnes came up against rigid Russian resistance on all these points, and at the Conference itself all he was able to secure was a further consideration of the vexed questions by the Foreign Ministers' deputies, together with the understanding that the Ministers themselves would meet again on June 15. The Russians refused to consider the possibility that a full Peace Conference should meet before the Big Four had agreed the draft treaties. In any large Conference they are in a minority, and know that wider discussion simply means more pressure on them. But Mr. Byrnes wishes to call the wider Conference for precisely that reason. In the light of other conferences he clearly believes that "world opinion" would not point in the Russian direction.

This time, he has, therefore, refused to allow the Great Power deadlock to remain at the Conference table. The culminating point in America's new diplomatic crusade is undoubtedly Mr. Byrnes' determination, at the June meeting of the Ministers, to secure agreement on the calling of a full peace conference in July, and, failing that, to bring the whole question of peace-making before the General Assembly of the United Nations. In his broadcast report to the American people on the Paris Conference, Mr. Byrnes said categorically:

> The four Allied Governments cannot indefinitely delay the making of peace with countries which they have long since ceased to fight simply because they cannot agree among themselves on peace terms.

The obvious corollary of this statement is the determination of the United States to draw up peace treaties without Russia if agreement cannot be reached.

This is the issue which the Powers must consider before their June meetings. Are they to persevere in the attempt to base the postwar settlement on Great Power agreement? Or should they admit an irreconcilable division and determine to go their own way in their own sphere of influence? Such a decision cannot be taken lightly. It determines the whole character of the future peace. Nor is it easy to say on which side the balance of advantage lies. It is clearly very damaging to any prospects of reconstruction and recovery to leave seven states in Europe without a definitive political or economic framework. Uncertainty leaves men a prey to revisionism.

(CONTINUED ON PAGE 169)

Workers' Committees Inspect the Books Of French Concerns

Paris

• • • **The French Constituent** Assembly has increased the scope of labor-management committees in economic affairs, and has reduced the minimum number of workers in a plant beyond which working committees must be formed. A decree of Feb. 22 fixed the minimum number of employees at 100, but the new act provides that a works committee must be set up if the number employed is 50 or more.

The working committees will continue to act only in an advisory capacity, but they will be empowered to suggest how profits are to be used, and the committee accountant will be entitled to inspect the books.

The members of the committee will be in a position to see the documents placed before the shareholders, such as the list of shareholders and the balance sheets presented at shareholders' meetings, and also the documents presented to the last three annual meetings and the minutes of the proceedings. Further, as far as a limited company is concerned, two members of the committee who are appointed by the committee (one representing the executive and managing staff, the other representing the workers and employees) will be present in an advisory capacity at all the meetings of the administration.

The works committee will have the right to advise on price increases. They can be consulted by those in charge of price fixing.

Mining Company Plans New Sintering Plant

Painesville, Ohio

• • • **Reports that** Butler Bros. Iron Mining Co. will build an iron ore sintering plant at nearby Fairport have been brought into sharp focus with an unofficial disclosure that plans have been completed for a concrete block and steel building 240 x 72 ft.

While no official announcement has been made sources in the trade point out that prior to the war Butler Bros. sold a fine ore concentrate at a very low price which was subsequently frozen by OPA at the low introductory level. None of this concentrate has been available for some time, leading some observers to believe that Butler Bros. will use the new plant for sintering this ore.

During the war much consideration was given to bringing ore down the Lakes and sintering at the ports or as close to the plants as possible. Sintering operations on the Mesabi require that fuel be brought up the Lakes, making sintering at the ports a considerably less expensive operation.

Hard to Take

Coatesville, Pa.

• • • For the first time in its 136 yr of business, Lukens Steel Co. has been compelled by shortages of raw materials needed in steel manufacture, and by other conditions beyond the company's control, to close its plants and offices, as well as those of its subsidiaries, By-Products Steel Corp., and Lukenweld, Inc., from June 2 to June 6, inclusive, according to Robert W. Wolcott, president. The order affects 5000 employees.

WAA Sees Progress In Machine Tool Disposal

Washington

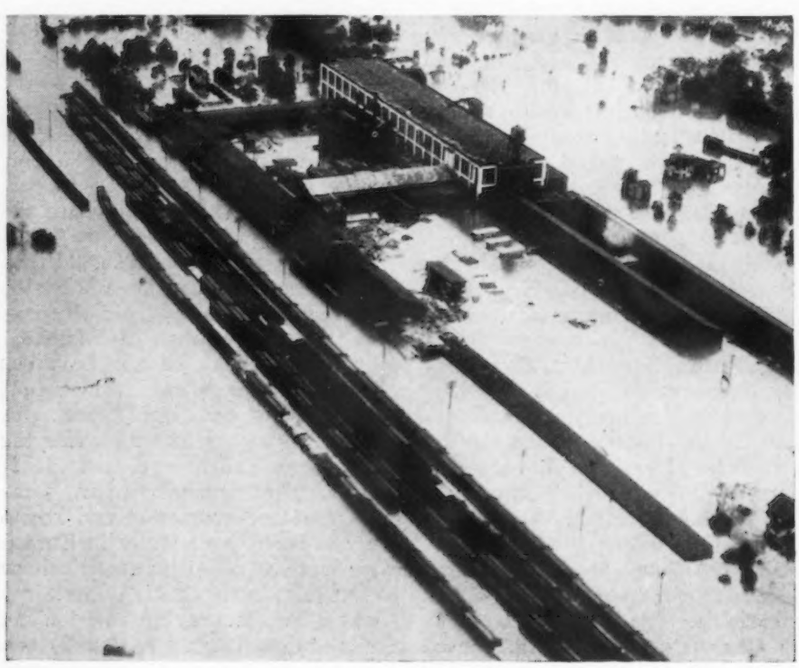
• • • **Cumulative sales** of machine tools and production equipment sold through May 15 amounted to $53,788,000 (in original cost) on which the government recovered nearly one-half or approximately $25,526,000, WAA has announced.

During the first half of May, dealer-agents sold about $8.9 million worth for a return of $4.5 million, a slight decrease over the last half of April but more than any similar half-month period prior to that month.

Regional WAA office sales, including dealer sales, through Apr. 30 amounted to $179,674,000 with a total recovery to the government of $87,000,000, the agency reported. During the 5-week period of Mar. 23 to Apr. 30, some $121 million worth more was received than sold, the machine tool division said.

The Apr. 30 inventory of machine tools stood at about $639 million, representing approximately 150,000 complete tools in the hands of the WAA for disposition. Approximately 60,000 of the government-owned tools have been sold to date.

MORE TROUBLES: *Freight shipments will probably be delayed because of last week's heavy rains. Here are flooded railroad yards at Lock Haven, Pa.*



New Trustees Elected to CED To Facilitate Reoriented Program

New York

• • • **Election of 53 new** trustees of the Committee for Economic Development was announced June 5 by Paul G. Hoffman, chairman. This increase in the membership of the board is a first step in the reoriented CED program, which calls for intensifying and accelerating research on problems bearing on the maintenance of high levels of production, distribution and employment, Hoffman said.

"All of these new members, together with the present 26 trustees who will continue in office, are convinced of the urgent need for business to develop responsible policy recommendations based on objective research which will contribute to the maintenance of high level employment within the framework of a free society," he added.

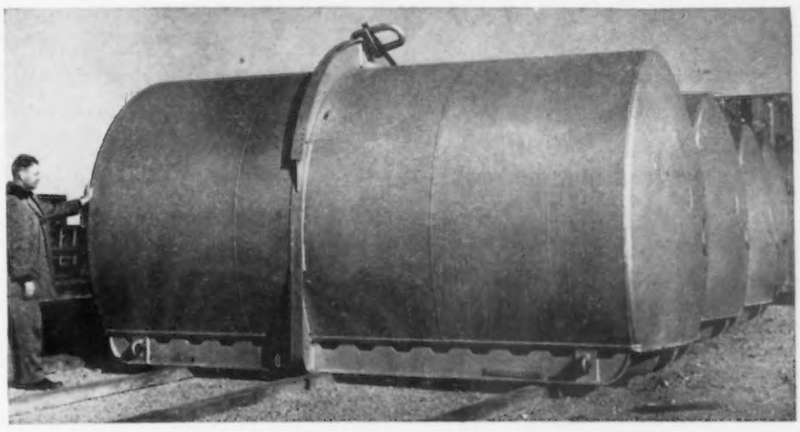
The names of the trustees and their business affiliations are: *Paul G. Hoffman, chairman of the CED board, and president, the Studebaker Corp., South Bend; *Ralph E. Flanders, vice-chairman of the CED board, and consultant to the board, Federal Reserve Bank, Boston, and chairman, Jones & Lamson Machine Co., Springfield, Vt.; *Marion B. Folsom, vice-chairman of the CED board, and treasurer, Eastman Kodak Co., Rochester, N. Y.; *Walter D. Fuller, vice-chairman of the CED board, and president, Curtis Publishing Co., Philadelphia; *Eric A. Johnston, vice-chairman of the CED board, and president, Motion Picture Assn. of America, Inc., Washington; George S. Armstrong, president, George S. Armstrong & Co., Inc., New York; John D. Biggers, president, Libbey-Owens-Ford Glass Co., Toledo; Harry A. Bullis, president, General Mills, Inc., Minneapolis; *W. Gibson Carey, Jr., president, The Yale & Towne Mfg. Co., New York; O. C. Carmichael, president, Carnegie Foundation for Advancement of Teaching, New York; John W. Carpenter, president, Texas Power & Light Co., Dallas; William Chenery, publisher, Collier's, New York; *Frank A. Christensen, vice-president, The Continental Insurance Co. and Fidelity & Casualty Co., New York; *W. L. Clayton, assistant secretary of State for Economic Affairs, Dept. of State, Washington; M. C. Clement, president, The Pennsylvania Railroad Co., Philadelphia.

Also, Erle Cocke, president, The Fulton National Bank of Atlanta, Atlanta; Arthur H. Compton, chancellor, Washington University, St. Louis; Gardner Cowles, president and publisher, Des Moines Register & Tribune, Des Moines; George D. Crabbs, chairman of the board, Philip Carey Mfg. Co., Cincinnati; Donald David, dean, Graduate School of Business Administration, Harvard University, Boston; *Chester C. Davis, president, The Federal Reserve Bank, St. Louis; Clarence Dykstra, provost, University of California, Los Angeles; Morris Edwards, vice-president, Cincinnati Street Railway Co., Cincinnati; *Milton S. Eisenhower, president, Kansas State College of Agriculture and Applied Science, Manhattan, Kan.; O. J. Elder, president, MacFadden Publications, Inc., New York; James A. Farley, chairman of the board, Coca-Cola Export Corp., New York; R. Earl Fisher, vice-president, Pacific Gas & Electric Co., San Francisco; Percival E. Foerderer, president, Robert H. Foerderer Estate, Inc., Philadelphia; William C. Foster, vice-president, Pressed & Welded Steel Products Co., Long Island City, N. Y.

Also, *Clarence Francis, chairman of the board, General Foods Corp., New York; Alfred C. Fuller, chairman of the board, Fuller Brush Co., Hartford; Frederick V. Geier, president, Cincinnati Milling & Grinding Machines, Inc., Cincinnati; George L. Harrison, president, New York Life Insurance Co., New York; Robert Heller, president, Robert Heller & Associates, Inc., Cleveland; *Lou Holland, president, Holland Engraving Co., Kansas City; *Charles R. Hook, president, American Rolling Mill Co., Middletown, Ohio; *Jay C. Hormel, president, George A. Hormel Co., Austin, Minn.; *Reagan Houston, industrialist and merchant, San Antonio; Henry R. Johnston, New York; *Harrison Jones, chairman of the board, Coca-Cola Co., Atlanta, Ga.; Thomas Roy Jones, president, American Type Founders, Inc., Elizabeth, N. J.; Ernest Kanzler, chairman of the board, Universal C.I.T. Credit Corp., Detroit; Henry P. Kendall, president, The Kendall Co., Boston; *Fred Lazarus, Jr., president, Federated Department Stores, Inc., Cincinnati.

Also, *Thomas B. McCabe, president, Scott Paper Co., Chester, Pa.; William McClellan, Alexandria, Va.; James H. McGraw, Jr., president, McGraw-Hill Publishing Co., Inc., New York; George H. Mead, chairman of the board, Mead Corp., Dayton; Eugene Meyer, editor and publisher, Washington Post, Washington; C. Hamilton Moses, president, Arkansas Power & Light Co., Little Rock, Ark.; Malcolm Muir, president and publisher, Newsweek, New York;

CAN THE GUNS: *Several 90 mm anti-aircraft guns have been canned in a hermetically-sealed steel container equipped with an unloading hook. All joints and seams are electrically welded and the only opening is for occasional insertion of nitrogen gas. The scene is Pueblo Ordnance Depot, Pueblo, Colo.*



William A. Patterson, president, United Air Lines, Chicago; Malcolm Pirnie, New York; Philip D. Reed, chairman of the board, General Electric Co., New York; *Reuben B. Robertson, executive vice-president, Champion Paper & Fibre Co., Canton, N. C.; Nelson A. Rockefeller, New York.

Also, Raymond Rubicam, New York; Beardsley Ruml, chairman of the board, R. H. Macy & Co., New York; Louis Ruthenburg, president, Servel, Inc., Evansville, Ind.; *Harry Scherman, president, Book-of-the-Month Club, New York; Harper Sibley, Sibley Farms, Inc., Rochester, N. Y.; George A. Sloan, president, Nutrition Foundation, Inc. and chairman of the board, Southern Agriculturist, New York; S. Abbot Smith, Thomas Strahan Co., Chelsea, Mass.; Christian H. Sonne, partner and director, Amsinck, Sonne & Co., New York; *Robert Gordon Sproul, president, University of California, Berkeley; Grant Stauffer, president, Sinclair Coal Co., Kansas City; *Elmer T. Stevens, president, Charles A. Stevens & Co., Chicago; *John Stuart, chairman of the board, Quaker Oats Co., Chicago; *Wayne C. Taylor, Washington, D. C.; J. Cameron Thomson, president, Northwest Bancorporation, Minneapolis; Niles Trammel, president, National Broadcasting Co., New York.

Also, Lewis C. Upton, president, Nineteen Hundred Corp., St. Joseph, Mich.; Alan Valentine, president, University of Rochester, Rochester, N. Y.; John H. Van Deventer, president and editorial director, THE IRON AGE, New York; *Sidney J. Weinberg, Goldman, Sachs & Co., New York; *Charles E Wilson, president, General Electric Co., Schenectady; H. Carl Wolf, managing director, American Gas Assn., New York; J. D. Zellerbach, president, Crown Zellerbach Corp., San Francisco; and Harry W. Zinsmaster, president, Zinsmaster Bread Co., Duluth.

Commenting on the work facing CED Hoffman said: "For the three years prior to VJ-Day CED, operating as a private, nonprofit, nonpolitical organization financed by contributions from business had two objectives. The first was to help individual businessmen to plan during the war for quick reconversion and expanded operations after victory. The CED Field Development Div., responsible for this task, organized and serviced nearly 3000 local community committees with a membership of more than 70,000 businessmen.

"There is general agreement that the activities of these committees contributed substantially toward attaining the high employment which has prevailed since VJ-Day. With its task completed, the national Field Development Div. was disbanded in February of this year.

"The second CED objective was to help create an economic climate favorable to the attainment and maintenance of high productive employment. For this purpose the research division was organized. Up to the present time its studies have been concerned largely with the transitional problems. It has just begun to tackle such long-range questions as the special problems of small business, the problems of wage price policy and those of coordinating government fiscal and monetary policies. Its most ambitious prospective undertaking is an effort to find an answer to the sixty-four dollar question: What can and should a government of a free people do to promote national prosperity?"

The research and policy committee, made up of businessmen, which is responsible for this program, will be enlarged. Ralph E. Flanders, chairman of the board of the Jones & Lamson Machine Co. and consultant to the board of the Federal Reserve Bank of Boston, will continue as chairman.

In order to make available to interested groups the findings of the research and policy committee, a new national CED information committee is being formed under the chairmanship of Walter D. Fuller, president of the Curtis Publishing Co., Philadelphia. Its membership and program will be announced shortly, Hoffman said. He added that the board of trustees is still in process of formation and that the new board will meet for the first time on July 12.

** Now a trustee of CED*

Coming Events

June 13 **Metal Powder Assn.,** spring meeting, New York.

June 17 **American Society of Mechanical Engineers,** machine design group, first session, Detroit.

June 17-18 **American By-Product Coke Institute,** first annual meeting, Seaview Country Club, Absecon, N. J.

June 17-20 **American Electroplaters Society,** annual convention, Pittsburgh.

June 24-28 **American Society for Testing Materials,** annual meeting, Buffalo.

July 22-23 American Washer & Ironer Manufacturers Assn., French Lick, Ind.

Sept. 10-14 **American Chemical Society,** exposition, Chicago.

Sept. 11-12 **Society of Automotive Engineers,** national tractor meeting, Milwaukee.

Sept. 16-20 **Instrument Society of America,** first conference and exhibit, Pittsburgh.

Oct. 1-4 **Iron & Steel Exposition,** Cleveland Public Auditorium, Cleveland.

Oct. 3-5 **National Electronic Conference,** Chicago.

Oct. 3-5 **Society of Automotive Engineers,** aeronautic meeting and display, Los Angeles.

Oct. 28-30 **American Gear Manufacturers Assn.,** semi-annual meeting, Chicago.

Nov. 7-8 **National Founders Assn.,** annual meeting, New York.

Nov. 18-22 **National Metal Congress** and Exposition, annual meeting, Atlantic City, N. J.

Sweden Develops Specialized Steels For Foreign Markets

By HANS G. TONNDORF

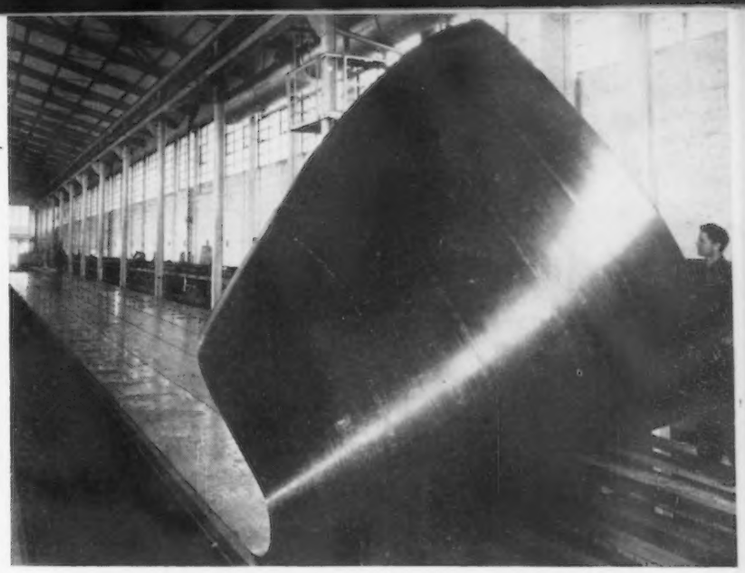
New York

• • • **Iron has been produced in** Sweden for about 2100 yr and for half that period, Sweden has been an exporter of that product. During the most prosperous period of that industry, around 1740, Sweden produced about one-third of the world's total and was by far the most important exporter. At that time, Swedish iron accounted for about 40 pct of Great Britain's total iron consumption. Also in America, both in colonial times and later, Swedish iron found a ready market. Swedish iron and steel has, in fact, been exported to this country during a longer continuous period than any other product from any other country.

Sweden's predominance in the field of iron industry was, of course, largely due to its abundant supply of charcoal and the unusual purity of its iron ore. With the development of coke as a reducing agent, and the modern smelting processes, Sweden lost completely its position as a tonnage producer. However, in the field of high quality steels the country still enjoys a notable place. Without coal deposits of its own Sweden is, in fact, the only country in the world which has maintained a flourishing and largely exporting iron industry.

Instead of insisting upon self-sufficiency on the basis of the country's abundant iron deposits, Sweden has turned to the great mass-producing countries for a substantial portion of its needs of ordinary iron while concentrating its domestic industry on the production and export of high quality steels. Thus, prior to the war, Sweden imported annually about 400,000 tons and exported about 200,000 tons of iron and steel.

Although the commercial grades of iron also are manufactured in competition with imported goods, close to 60 pct of Sweden's steel production is normally made up of high quality grades. Most of it is of the acid openhearth type, with the pig iron processed from the pure iron ores of Central Sweden, and with charcoal as reducing agent.



o o o BUT WHERE'S THE SUGAR?: *This steel conveyor belt made by the Sandvik Steel Works, Sweden, is made of five 800 mm wide cold-rolled, hardened and tempered bands longitudinally jointed by means of a special, patented method. It is 3900 mm wide (13 ft approx) and 54 m long and is used in the transport and storage of lump sugar.*

Recent developments in metallurgy have undoubtedly deprived the Swedish steel of much of its prestige. Through repeated refining operations, it has become possible to remove those flaws inherent in raw materials of lower quality, and thus arrive at a product of equal or even greater purity than the Swedish steel.

This trend has proved to be a great threat to the international position of the Swedish steel industry. However, it has not turned out as disastrous as might be imagined. For one thing, these refining operations are a costly process and, consequently, these refined steels in many instances prove to be more expensive than the nature-made Swedish product. The substantial exports of Swedish wire for valve springs used in automobile and aircraft engines can be attributed to this fact. Also the experiments carried out some years ago by the Swedish SKF revealed that the Swedish acid openhearth steel is still superior to other types in quality and price.

In order to meet the growing competition of foreign high class steels the Swedish mills have more and more concentrated on exclusive and highly specialized fields. They have devoted their main attention to small needs which, on the one hand, are hard to fulfill and, on the other hand, not big enough to attract the interest of the domestic tonnage-producing mills in the countries which are concerned.

In devoting its efforts to such highly complex and hard-to-fill requirements, the Swedish steel industry derived great advantage from the wide geographical distribution of its markets in 60 different countries. For one thing, this wide coverage of markets made it possible to supply small amounts to the individual markets but still, by collecting similar requirements from other countries, to arrive at a reasonable standardization and production efficiency. Furthermore, through their worldwide connections, the Swedish mills obtained an unusual insight into the special needs of a great many industries.

This latter factor has proved to be a great asset Thus, the experience gained from supplying the Swiss watchmakers with spring steel was a great advantage in competing for deliveries to the expanding watchmaking industries in the United States, the Soviet Union and elsewhere. Likewise, in contacting the business-machine manufacturers in Germany, the Soviet Union and Switzerland, the Swedish steel mills could profit from the know how they had acquired from previous supplies to American manufacturers in the same line.

Sometimes, coincidence has turned over a developing industry to the use of Swedish steel. This seems to have been the story of razorblade steel. One day, many years ago, a certain Mr. Gillette told a friend of his during a walk in Boston that he was working on an invention of a razor with inter-

(CONTINUED ON PAGE 156)

Industrial Briefs . . .

• TO PRODUCE PRESSES—The E. W. Bliss (England), Ltd., company has concluded arrangements with the British firm of Thomas Firth & John Brown, Ltd., for the manufacture in Sheffield, England, of large Bliss presses of welded steel construction. These added facilities will make available to British industries the latest advances in press engineering and its application to sheet metal manufacture. It will also permit the Bliss company's own works in Derby, England, to concentrate on the construction of the medium and small size presses, canmaking machinery and dies.

• BUYS G-P PLANT — Chrysler Corp. has announced the purchase of the Graham-Paige plant at 8505 W. Warren Ave. in Dearborn for $2,750,000. Chrysler gave no details of its expansion program.

• ACQUISITION — Pennsylvania Wire Rope Corp., Williamsport, Pa., has acquired the total assets of Brewer Mfg. Co., Williamsport, and are manufacturing wire rope, strand, and wire rope specialties.

• AWARDS CONTRACT — C. D. Howe, Minister of Reconstruction and Supply announced that a contract has been awarded to A. V. Roe Canada Ltd. to carry on design and development of gas-turbine aircraft engines. This work formerly was undertaken by Turbo Research Ltd., a government-owned company. A. V. Roe Canada Ltd., the Canadian branch of the Hawker-Siddeley Aircraft Co. of England will work in close collaboration with its associated companies in the Hawker-Siddeley group.

• PLANS ADDITION — Botwinik Brothers of Massachusetts, Inc., Worcester machine tool rebuilders, plans erection of an addition to give 7000 sq ft additional floor space as soon as conditions permit.

• FOLLANSBEE EXPANDS — Establishment of shearing facilities at the Pittsburgh and Rochester, N. Y., warehouses of the Follansbee Metal Warehouses Div. of Follansbee Steel Corp. was announced. The warehouses also are expanding their lines of flat-rolled products, majoring in cold strip and sheets with stocks of electrical sheets to be added later.

• CASTING COMPANY—The Cast Metals Corp., Deshler, Ohio, has recently been organized by Doyle M. Carbin who heads the company as president and general manager. The new company is a jobbing foundry, manufacturing gray iron castings, specializing in squeezer work and cope and drag production castings up to 100 lb.

• PATENTS—A compilation of patents listed in the booklet, "Dedicated Patents," may be obtained for 10¢ each from the U. S. Patent Office.

• NEW COMPANY—The Gathmann Industrial Corp., metallurgical consultants and manufacturers' representatives, has recently been formed at Stock Exchange Bldg., Baltimore, Md.

• STEEL CONTROLLER—J. C. Carr, principal assistant secretary in the British Ministry of Supply, has been appointed acting controller of iron and steel in the interim period pending the setting up of the proposed new control board. Mr. C. R. Wheeler relinquished his appointment as controller on Apr. 30 to return to his firm.

• NEW RIVNUT USES—Several new uses for the Rivnut, which can be used as a blind rivet, nut plate, or both, have been reported by the B. F. Goodrich Co. New uses include applications on record changers, for attaching storage shelves and freezer units on several makes of refrigerators, and bayonet door catches to kitchen cabinets.

OPA Increases Price Of Gears and Pinions

Washington

• • • **Manufacturers of** gears, pinions, sprockets and speed reducers may increase their maximum prices by 13 pct, OPA has announced.

Effective May 27, the increase applies only to the products made by manufacturers generally recognized as members of the "gear" industry and which are used in nearly all motor-driven machinery and many other machines. However, manufacturers of automotive and tractor transmissions, transfer cases, power take-offs, differential and axle assemblies and manufacturers of other items for use in private or commercial tractor vehicles were not included in the survey on which this action is based and so are excluded from the price increase.

A special arrangement is provided for manufacturers who produce or supply motors to which they add gears, because of price increases granted on May 13, 1946, to these motor manufacturers. In order to provide for both the increases for motors and for gears, the action provides these manufacturers with a table of net unit increases applicable to any gear motor, made and sold as a unit. However, they are given the option of either using the table or the 13 pct increase in pricing complete units.

More than 95 pct of the products covered by this action are sold direct to users. Resellers, representing the remaining 5 pct, may increase their prices the dollar-and-cent amounts that their costs are raised.

Committee Allocates Tin

Washington

• • • **Announcement of an** additional allocation of 9476 gross tons of tin for the first half of 1946 has been made by the Combined Tin Committee through CPA. The largest amount, totaling 2840 tons, went to France. The United States was second with 2350 tons and Canada third with 1070 tons. Among other allocations were: India, 640; Italy, 533; Latin America, 400; Switzerland, 400; Sweden, 300; Netherlands, 240; UNRRA, 202, and Finland, 150.

Construction Steel...

• • • **Fabricated steel awards** this week included the following:

6020 Tons, Friant, Calif., needle valves, hollow jet valves, etc., Madera Canal Outlet, Friant Dam, Bureau of Reclamation, Denver, Spec. 1173: schedule 1, to Joshua Hendy Iron Works; schedule 2, to Hardie Tynes Mfg. Co., Birmingham.

2650 Tons, Odair, Wash., trashracks for right powerhouse at Grand Coulee Dam, Bureau of Reclamation, Denver, Spec. 1291, to Joshua Hendy.

1150 Tons, Coram Calif., coffer dam for Bureau of Reclamation, to Consolidated Steel Corp., Los Angeles.

795 Tons, Milwaukee, Heil Co., plant, to Bethlehem Steel Co., Bethlehem, Pa.

700 Tons, St. Clair, Pa., repairs to coaling station of Reading Co., to Welding Engineers, Norristown, Pa.

335 Tons, Philadelphia, warehouse for Charles Lennig Co., to Bethlehem Steel Co.

300 Tons, Bremerton, Wash., Inactive Fleet berthing facilities, Spec. 17430, through General Construction Co. to Pacific Car.

232 Tons, Coram, Calif., three coaster gates for Shasta Dam, Bureau of Reclamation, Denver, Spec. 1223, to American Bridge Co.

• • • **Fabricated steel inquiries** this week included the following:

3675 Tons, Milan, Ill., bridges, bids due June 7.

2600 Tons, Bull Shoals, Ark., Bull Shoals Dam, bids due June 29.

1428 Tons, Redding, Calif., three drumgates for spillway, Shasta Dam, Bureau of Reclamation, Denver, Spec. 1220, bids under advisement.

1200 Tons, Allegheny City, Pa., Pennsylvania Dept. of Highways, bridges, LR 763, Sect. 5A, bids due June 13.

785 Tons, Lafayette, Ind., housing project.

687 Tons, Coram, Calif., river outlet gates for Shasta Dam, Bureau of Reclamation, Denver, Spec. 1253, bids under advisement.

600 Tons, Allegheny City, Pa., Pennsylvania Dept. of Highways, bridge, LR 763, Sect. 6, bids due June 13.

500 Tons, Philadelphia, maintenance building for Gulf Oil Co., through Hughes Spoke Rod Co.

490 Tons, Kingman, Ariz., fixed wheel gates, Davis Dam, Bureau of Reclamation, Denver, Spec. 1203, bids under advisement.

475 Tons, Kearny, N. J., North Tract Building, Western Electric Co.

420 Tons, Northumberland City, Pa., 3 bridges for Pennsylvania Dept. of Highways.

300 Tons, Danville, Pa., machine shop for Boyd H. Kline.

300 Tons, Polk County, Iowa, highway work.

300 Tons, Nash, Utah, penstocks, Bureau of Reclamation Specification.

200 Tons, Oakhurst, Calif., highway bridge, Bureau of Reclamation Specification 1294, bids in.

128 Tons, Chicago, Cassell Building.

100 Tons, Odair, Wash., steel warehouse, Bureau of Reclamation Specification 1341.

100 Tons, Mancos, Colo., 36-in. pipe, Bureau of Reclamation Specification 1359, bids due July 3.

• • • **Reinforcing bar awards** this week included the following:

2000 Tons, Bremerton, Wash. Inactive Fleet berthing facilities, Specification 17430, through General Construction Co. to Bethlehem Steel Co.

200 Tons, Lyon County, Iowa, highway paving to Ceco Steel Products Corp., Chicago.

145 Tons, Elgin, Ill., state hospital to Concrete Steel Co., Chicago.

• • • **Reinforcing bar inquiries** this week included the following:

6500 Tons, Stickney, Ill., sewage treatment plant, M. J. Boyle & Co., Chicago, low bidder on general contract.

545 Tons, Friant, Calif., miscellaneous bars, Bureau of Reclamation, Denver, Inv. A-48,776-A-1, bids open June 4.

505 Tons, Cloquet, Minn., power house and warehouse.

400 Tons, Granby, Colo., Granby Dam and Dikes, Bureau of Reclamation, Denver, Spec. 1265, Granby Constructors, Denver, low bidder for general contract.

• • • **Sheet piling awards** this week included the following:

1600 Tons, Bremerton, Wash., Inactive Fleet berthing facilities, Spec. 17430, through General Construction Co. to Bethlehem Steel Co.

1600 Tons, Bremerton, Wash., Inactive Fleet berthing facilities, Spec. 17430, through General Construction Co. to Columbia Steel Co.

500 Tons, Hastings, Neb., U. S. Engineer project, to Inland Steel Co., through United Construction Co.

• • • **Plate inquiries** this week included the following:

2500 Tons, Springfield, Mass., 48-in. welded steel water transmission line.

325 Tons, Seattle, steel tank and tower at Magnolia Bluff, Board of Public Works, Seattle, Chicago Bridge & Iron Co., low bidder.

• • • **Rail inquiries** this week included the following:

760 Tons, Lane County, Ore., relocation Oregon Pacific & Eastern R.R. U.S. Engineer Office, Portland, Spec. 331, bid on file for general contract.

S. Chicago Steel Plant Up for Bidding Again

Washington

• • • **War Assets Administration** has announced that the government's South Chicago steel plant would be readvertised for disposal by either sale or lease on a negotiated basis, such negotiations to be conducted in Washington.

Announcement of this newest move of WAA to get out from under the war plant business was made after the agency's Price Review Board rejected all bids for the South Chicago property which had been opened and read on May 1. Of the bids submitted, none was considered by the Board to return to the government a fair value of the property as required by the Surplus Property Act.

Three bids in all were submitted, one of which was withdrawn leaving only Republic Steel Corp.'s proposal to lease and another by C. A. Depue of Clinton, Iowa, to purchase the plant outright. The Board said that it would make determined effort to dispose of the plant as quickly as possible. When negotiators appear to be reaching a satisfactory amount, the Board added, a cut-off date will be set for further offers.

Europe Faces Serious Coal Shortage This Year

Paris

• • • **Europe will** be faced with a coal deficit of 44 000,000 tons in the year beginning in June unless special action is taken. This was officially announced at the end of the International Coal Conference in Paris.

The conference, which was called by the European Coal Organization, has decided to appeal to all governments and international organizations concerned to insure adequate food for miners, to provide special incentives for labor recruitment to the mines, to give special priority to the manufacture and distribution of mining equipment and mining supplies, and to insure lift and transport facilities for every ton of coal mined.

The conference has warned the governments concerned that these measures are essential if dislocation of almost all industries is to be avoided, and that application of these measures cannot fulfill the minimum needs of Europe unless accompanied by rigid control of consumption and maximum coal exports from Germany. It has also decided on an urgent examination by the European Coal Organization of the possibilities of introducing special methods of trading coal, including bilateral agreements, as an incentive to increased production, and of taking special account of certain uses of coal notably for steel production when planning the allocations of coal and coke.

Milcor's Prices Upped

Washington

• • • **OPA has granted** the Milcor Steel Co., Milwaukee, a price increase of 8.6 pct on cast and sheet metal building materials covered by MPR 591, effective May 21. Resellers were authorized to pass the increased costs to consumers.

MACHINE TOOLS

. . . News and Market Activities

May Production Steady; June to Drop

• • • **Major segments of** the machine tool industry wound up the month of May in pretty good shape. New orders were reported coming in at levels 50 pct above the prewar normal in some cases; the industry's backlog of unfilled orders stood at a not inconsiderable $180,000,000; and despite major strikes and shortages and a little labor trouble of its own, the industry's best second-guessing skeptics were about ready to admit that machine tool production had been maintained remarkably well.

On the other hand, competent observers were ready to predict that serious interruptions in machine tool production lie ahead, and that May figures for the industry will reflect clearly the real interruptions and that June figures will be worse. The shortage of steel, it is alleged, will be an atomic solar plexus punch.

According to some sources in the industry, a number of orders were in a state of delicate balance while the major strikes were underway. Now that they have been settled, a brisker demand for machine tools is anticipated, with most of the business coming from the smaller buyers. At the same time, it is felt that foreign business should take a definite upturn despite the better delivery situation prevailing in the British machine tool industry. According to French Government figures, postwar France wants and possibly needs 126,000 machine tools, which to some degree substantiates the belief that foreign business is going to be a sizable factor. Belgium wants about $31,000,000 worth of machine tools, or about 7100 units, based on Belgian Government estimates, which like the French reports should not be taken too literally.

Marketwise, the government owned surplus continues to be a far reaching factor. In Boston, demand for new tools is slack, according to reports, and more and more builders' representatives are going after the surplus machine tool business. In the Boston area, probably 75 pct of sales by newcomers into this field are from government holdings, and firms handling the surplus, since it was first made available through dealer channels, report as high as 90 pct of their business is in surplus tools.

Similarly, turnover in surplus equipment is naturally beginning to gather momentum with the selling field broadening. Sources in the new and used tool trade report that the government-owned surplus will continue to hold the center of the stage for a time at least.

In Chicago the WAA office is holding its first big sale since inauguration of the new priorities, with total inventories of about $12 million involved. Machine tools at the Foote Bros. Gear & Machine Co., Chicago, and Bendix Aviation Corp., South Bend, Ind., and miscellaneous supplies and equipment, including light machine tools from the Army Air Forces, Chicago, went on sale June 5 with buying continuing through June 15. The Air Corps offerings will go on the basis of bids. Equipment at the Foote Bros. and Bendix site sales will be sold at fixed prices under the Clayton formula. In all three cases, priorities will be observed, with priority claimants being given an opportunity to purchase before awards are made to commercial purchasers.

In Cincinnati, the coal and railroad strikes caused some interruptions in production among machine tool builders. Delay in receiving materials brought about some rearrangement of shop schedules and in making shipment of tools already completed. Nonetheless, reliable sources in the industry report that new business continues in fair volume, with foreign and domestic users splitting the new order spread.

Generally, the Cincinnati machine tool products picture is unchanged, with strikes in several plants still unsettled and little evidence pointing to settlement in the immediate future, according to some observers.

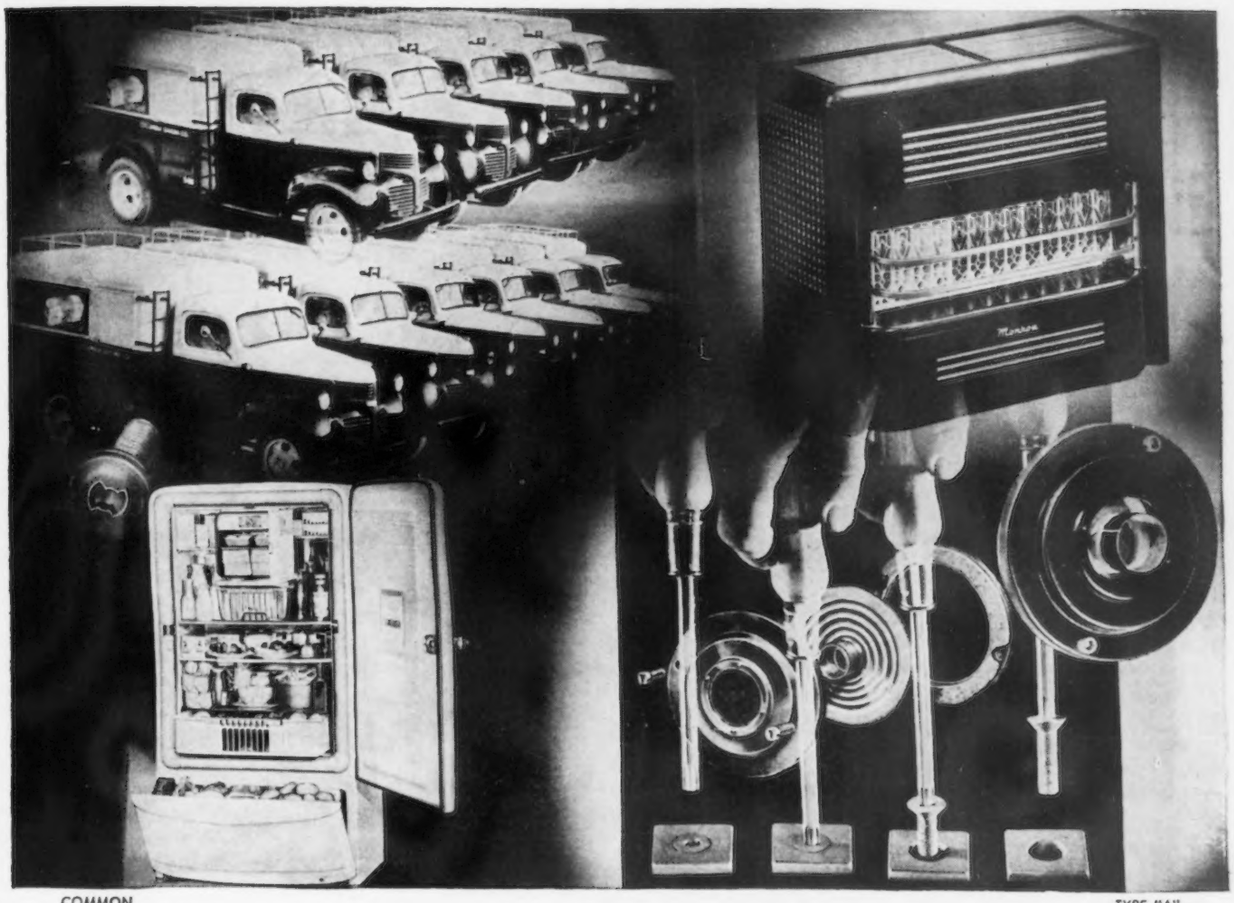
At Detroit, there has been no change of any consequence in the machine tool market. Volume business is about the same, cancellations light, and foreign orders are holding up well. Production is much hampered by the shortage of fractional horsepower motors, and in some cases, customers are supplying their own.

In Philadelphia, dealers report little or no export of new tools, and in considering the possibility of export business for machine tools, one dealer here observes a significant lack of sound information about the tool needs of foreign countries, which serves to handicap selling abroad. With rare exceptions, foreign users do not require highly specialized machine tools; do not have adequate horsepower available to operate typical U. S. tools; nor do they require their high production rates in consideration of the extremely low wage rates prevailing in most foreign countries.

Dealers are not overly optimistic that the slump in orders observed in January, and continued largely because of the strike situation, is likely to be reversed now because of the conclusion of wage and price agreements. They detect a note of caution on the part of business in committee itself to large obligations in the face of the prospect of long-term unsettlement of the domestic industrial scene.

Certain types of machine tools, such as large lathes and rail gang drills which were priced low with practically no profit in 1941 and have subsequently been increased only 20 pct, or on a weight basis, are practically unobtainable now because their makers cannot break-even on production cost. Would-be purchasers are simply unable to place an order for these tools, a situation some observers predicted three months ago.

At Cleveland, surplus government-owned machine tools, and industrial equipment, with an approximate value of $2,000,000, will be offered for sale June 10 to July 12 at the plant formerly operated by the Curtiss-Wright Corp., Beaver, Pa., according to WAA announcement.



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Clutch Heads Will Cut Your Assembly Costs Too

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The Lindsay Corporation, **CHICAGO**—"SIX instead of FIVE truck body assemblies"... this increase in production as compared with the use of other recessed head screws.

Dearborn-Monroe Company, **CHICAGO**—"Change-over to CLUTCH HEADS (*from other recessed head screws*) cut our Gas Heater assembly costs 22%... Your Type "A" Bit outlasts other bits 5 to 1... easy field service with flat blade is an important advantage."

Norge Refrigerators report — "Stepped-up production and elimination of cabinet damage"... tribute to CLUTCH HEAD'S protection against driver slippage.

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NONFERROUS METALS

. . . News and Market Activities

Copper and Lead Prices Increased by OPA

Washington

• • • **Increases in base** and maximum prices for brass, bronze, copper and lead products, including ingot and scrap, have been announced by OPA and made effective as of June 3.

Maximum base prices for primary copper and lead, secondary lead, lead scrap, and primary and secondary antimonial lead were increased in amounts ranging from 1.55¢ a lb for lead scrap to 2⅜¢ a lb for copper from mines granting approved wage increases.

Simultaneously, the agency announced price increases averaging 15.52 pct more than current ceilings on brass and bronze ingots. A third order permits a rise in ceiling prices for copper scrap, copper alloy scrap and brass mill scrap ranging from 1.25¢ a lb to 1.75¢.

Brass and Bronze Alloy Ingots. The bulk of the 15.52 pct average increase—about 12.18 pct—reflects higher costs due to increases in prices of copper and brass scrap. The remainder reflects cost increases indicated by an OPA survey of producers accounting for about 70 pct of the industry's 1945 production.

Increases for the principal grades in the various alloy groups—identified in terms of the relative copper and other metal content as listed in OPA's brass and bronze alloy ingot and shot regulation (MPR 202)—are as follows:

85-5-5-5 group, 2.25¢ per lb.
88-10-2 group, 2¢ per lb.
80-10-10 group, 2.25¢ per lb.
Yellow group, 2.25¢ per lb.
Miscellaneous group, 1.25¢ per lb.

In addition to the increases granted for the principal grades of the various groups, minor increases have also been given for individual ingot alloys and scrap items to correct price discrepancies, OPA said.

Scrap—Copper, Copper Alloy and Brass Mill. In order to maintain the proper relationship between the maximum base price of primary copper and scrap, increases in copper, copper alloy and brass mill scrap are permitted as follows:

1.75¢ per lb for most grades of copper and copper alloy scrap listed in Groups 1 and 2 of OPA's price schedules (RMPR 20);

1.25¢ per lb for most grades of copper and copper alloy scrap listed in Groups 3 and 4.

Other price changes are provided to continue differentials required by different grades of this scrap.

1.75¢ per lb for copper, tinned copper, commercial bronze, red brass and best quality brass grades;

1.25¢ per lb for yellow brass, Muntz metal and nickel silver grades.

Base Copper, Lead and Lead Products. Copper: 2⅜¢ per lb for mines which have granted approved wage increases since Feb. 14, 1946, making the maximum base price delivered in carload lots at Connecticut Valley points 14⅜¢ per lb; maximum prices for mines not affected by approved wage increases will remain unchanged at 12¢ a lb.

Lead: 1.75¢ per lb for primary lead at New York with similar increases in other basing point prices, raising the price from 6.5 to 8.25¢ a lb. Secondary lead is granted a similar 1.75¢ a lb increase.

Lead Scrap: 1.55¢ per lb. A similar price increase is permitted for battery lead scrap.

Antimonial Lead: 1.75¢ per lb for both primary and secondary antimonial lead, basing point prices.

OPA said the same increases were allowed primary and secondary lead inasmuch as they are used interchangeably. In regard to lead scrap, the agency said the scrap price was set 0.2¢ a lb less (1.55) in order to compensate smelters for increased costs of processing scrap.

The price agency explained that it has revised its lead plate battery formula (shipments of 8,000 or more lb) to provide a cut of 1.4¢ per lb from the product obtained by multiplying 8.35¢ a lb by the percentage of lead and antimony. This compares with the present deduction of 1.1¢ from a base of 6.65¢ per lb. The flat price per cwt in the alternate method of pricing shipments of less than 8,000 lb has been raised from $3.50 to $4.45. The price of used storage batteries has been raised from $2.39 to $3 per cwt.

A previous plan to extend the subsidy plan to all copper producers has been discarded, officials said. However, subsidy payments to spur production from high-cost marginal producers will be continued, it was said. It is hoped, the agency said, that the increased prices would reduce the premium payments by $7.5 million a year.

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Hollow-Ware Output Up

London

• • • **Aluminum hollow-ware** production in Britain (recommenced in December, 1944) continues to expand, according to the Board of Trade Journal. Value of output in March reached $1,908,000 and included 236,000 kettles and 1,536,000 saucepans. Comparable figures for September last were $628,000, $161,000 and $532,000, respectively. Of the total output in November-January of $12 millions worth of domestic hollow-ware, aluminum amounted to nearly one-third by value. More than half of the saucepans then produced and 28 pct of the kettles were aluminum. New uses are being sought for aluminum, while supplies of backplate and sheet steel of the required gage for hollow-ware are inadequate.

•

Canadian Copper Tight

Toronto

• • • **The copper supply** situation in Canada is generally tight and consumers report difficulty in obtaining supplies for current needs. The government has issued a release to dealers permitting them to sell copper stocks that had been frozen and this is expected to improve the supply for the immediate future. While some consumers have been able to maintain manufacturing operations due to the fact that they had accumulated copper stocks, others have been forced to curtail production schedules. Many consumers are still waiting for delivery against orders placed at the beginning of fourth quarter last year.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$30.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	14.375
Copper, electro, New York	14.125
Copper, lake	14.375
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz	$ 2.25
Iridium, dollars per troy oz	$110.00
Lead, St. Louis	8.10
Lead, New York	8.25
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$102 to $103
Nickel, electro	35.00
Palladium, dollars per troy oz	$24.00
Platinum, dollars per troy oz	$56.00
Silver, New York, cents per oz	70.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Zirconium copper, 6 pct Zr, per lb contained Zr	6.00

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	11.00
Aluminum, deoxidizing Nos. 2, 3, 4	9.50 to 11.25
Brass Ingot	
85-5-5-5 (No. 115)	15.50
88-10-2 (No. 215)	18.75
80-10-10 (No. 305)	18.25
No. 1 Yellow (No. 405)	12.50

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	22.10	..	22.08
Copper, H.R.	....	18.60	....
Copper drawn	....	19.60	....
Low brass, 80%	....	21.43	20.81
High brass	....	....	21.48
Red brass, 85%	....	21.64	21.69
Naval brass	21.40	20.15	25.83
Brass, free cut	....	16.04	....
Commercial bronze, 90%	....	22.35	22.40
Commercial bronze, 95%	....	22.56	22.61
Manganese bronze	25.10	....	29.33
Phos. bronze, A, B, 5%	....	39.02	38.77
Muntz metal	21.15	19.90	24.08
Everdur, Herculoy, Olympic or equal	....	26.53	27.33
Nickel silver, 5%	....	30.80	28.62
Architect bronze	20.15	....	....

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢, 52S-O, 67¢ 24S-T, 71¢: base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb and over.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb and over.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 27.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢ 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢; B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

(Continued, See Next Column)

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb or more, 46¢ a lb; 25 to 90 lb, 56¢; less than 25 lb, 66¢.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb, f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	10.50
No. 1 tinned copper wire, No. 1 tinned heavy copper	10.50
No. 2 wire, mixed heavy copper	9.50
Copper tuyeres	9.50
Light copper	7.50
Copper borings	10.50
No. 2 copper borings	9.50
Lead covered copper wire, cable	7.75*
Lead covered telephone, power cable	7.79
Insulated copper	4.75*

OPA Group 2†

Bell metal	17.25
High grade bronze gears	15.00
High grade bronze solids	13.25*
Low lead bronze borings	13.25*
Babbitt lined brass bushings	14.75
High lead bronze solids	11.75*
High lead bronze borings	11.75*
Red trolley wheels	12.50
Tinny (phosphor bronze) borings	12.25
Tinny (phosphor bronze) solids	12.25
Copper-nickel solids and borings	11.00
Bronze paper mill wire cloth	11.25
Aluminum bronze solids	10.75
Soft red brass (No. 1 composition)	10.75
Soft red brass borings (No. 1)	10.75
Gilding metal turnings	10.25
Contaminated gilded metal solids	9.75
Unlined standard red car boxes	10.00
Lined standard red car boxes	9.50
Cocks and faucets	9.50
Mixed brass screens	9.50
Red brass breakage	9.25
Old nickel silver solids, borings	8.00
Copper lead solids, borings	8.00
Yellow brass castings	7.25
Automobile radiators	9.00
Zincy bronze borings	8.75
Zincy bronze solids	9.75

OPA Group 3

Fired rifle shells	9.25
Brass pipe	8.50
Old rolled brass	8.00
Admiralty condenser tubes	8.50
Muntz metal condenser tubes	8.00
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	6.75[1]
Manganese bronze solids	5.75[2]
Manganese bronze borings	4.00[2]

OPA Group 4

Refinery brass	5.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 pct. [2] Lead content 0.41 to 1.00 pct.

Brass Mill Scrap†

Briquetted cartridge brass turnings	10.375
Cartridge brass turnings, loose	9.625
Loose yellow brass trimmings	9.625

Aluminum*

Plant scrap, segregated

2S solids	8.50 to 9.00
Dural alloys, solids 14, 17, 18, 24S, 25S	5.00 to 5.50
turnings, dry basis	3.50 to 4.00
Low copper, alloys 51, 52, 61, 63S solids	7.00 to 8.00
turnings, dry basis	5.00 to 6.50

Plant scrap, mixed

Solids	5.25
Turnings, dry basis	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.50
Old castings and forgings	6.00
Pistons, free of struts	5.00
Pistons, with struts	4.50
Old alloy sheet	3.00 to 4.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 1.40¢ a lb from refined metal basing point prices for soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb; 90 to 98% Ni, 23¢ per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18⅞
Rolled, oval, straight	19⅝
Curved	20⅝
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 pct plus, frt allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80¾

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 1-5 bbls	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	13.50
Silver cyanide, 100 oz lots, per oz.	0.655
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc sulphate, 89 pct, crystals, bbls, frt allowed	6.35

SCRAP

. . . News and Market Activities

Shortages Attributed to Ceiling Price

New York

• • • **Scrap is growing** ever tighter and steel mills are evidencing some alarm at future prospects for their operations when coal and pig iron are again available. This problem is becoming more and more acute and threatens to jeopardize the future of steel mill operations.

Observers are inclined to attribute the absence of available scrap to the ceiling price structure established by OPA before the start of the war and supported only recently by the recommendation of the Industry Advisory Committee. Many scrap dealers are reported to have diverted their activities from the scrap industry into other businesses and some have entered the surplus steel trade. This trend has been recognized to be the principal factor in the shortage of scrap even by some of those who supported the established ceiling prices not long ago.

The Institute of Scrap Iron & Steel is currently arranging meetings of its members in order to study the possibility of increased supplies of scrap through increased ceiling prices. There are those in the industry, however, who consider that this move is now too late for the dealers who have turned their attention elsewhere and are believed not likely to return to the scrap industry at this time.

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PITTSBURGH — Scrap demand is heavy here, but mills are not yet pressing dealers too hard. However, as steel production begins to climb in the next few weeks, demand will become increasingly great and the situation will tend to become critical. For any real scrap tonnage, mills will have to await better production of fabricators. No. 1 and No. 2 heavy melting scrap are practically nonexistent. Low phos is probably the heaviest grade moving in any quantity, and much of this is coming in from the East.

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PHILADELPHIA — Scrap is growing tighter and local mills are quite frank in stating that they fear a lack of adequate supplies when they are able to return to normal operations. A number of mills have taken a week's vacation to tide over the coal and pig iron shortage, but none has held up its scrap shipments.

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BUFFALO — Midwestern mills, which usually look to the Detroit area for supplies, have been shopping around in the local market although with little or no success. High water may hold up shipments through the Barge Canal until late in the month.

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CLEVELAND—Scrap here is growing tighter with steel scrap reaching the condition of cast. Larger plants are engaging in reciprocity arrangements with steel mills for return of scrap to their steel suppliers. Three steel producers have closed down for lack of scrap. The Navy's Material and Redistribution office offered for bid on June 4, 240 tons of prepared scrap and 775 tons of unprepared.

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ST. LOUIS—Granite City Steel Co. has closed down all operations because of a strike and this caused the diversion of scrap to other markets. However, Laclede Steel Co. is now operating all furnaces and is again accepting shipments. American Steel Foundries, heavy users of specialties, has resumed operations, and is again accepting shipments. Rains in the area have tended to slow down shipments, the extent of which is not known now. Prices are firm and unchanged.

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BOSTON—Little scrap is coming out, and the trade feels little is in sight. Yards can no longer bank on automobile scrap, parts from cars being more valuable than scrap. Prices are very firm. Trade looks for no boost in steel scrap values. Anticipated higher freight rates will be absorbed by mills, making the cost of scrap all that consumers can bear. Yards are beginning to report disgruntled yardsmen.

•

NEW YORK—With the soft coal and railroad strikes now in the background, the scrap industry is once more eyeing the future with the hope that scrap-producing mills will soon swing into full scale operations and replenish the sadly depleted yard scrap piles. No difficulty is expected in this area if the maritime strike does materialize, since the tugs are not involved in the dispute. Neither is any difficulty anticipated from the hard coal labor dispute

•

CINCINNATI—The termination of the rail strike brought the hope that more material would come into the market for scrap dealers anticipate some relief from the present tight situation. The relief, they anticipate, will be in a slightly increased amount of material, but of course they do not anticipate this to equal the present demand. There is no change in prices, nor in the almost frantic efforts to obtain acceptable material.

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BIRMINGHAM — Production of scrap in this area is at the lowest point in many months and shipments are very slow despite extremely heavy demand. The peddler, finding increased financial returns in other lines of activity, has disappeared from the scrap scene.

French to Resume Price Controls

Paris

• • • **French scrap prices are now under discussion by merchants, consumers, and the appropriate government ministry, that of national economy. Scrap trade controls were removed at the beginning of the year, but the question of prices is still unsettled.**

The new price schedule, expected shortly, will contribute greatly to clearing up existing market confusion, and is expected to contain two schedules as in French prewar days, one for merchants and one for producers.

TORONTO—There are no indications of easing in the scrap supply position. Both dealers and consumers are extending their efforts to obtain supplies in greater volume, but receipts fail to show improvement. All consuming interests, steel mills and foundries, are pressing dealers for more scrap but the latter are unable to cooperate pointing out that they are unable to obtain sufficient scrap to meet requirements.

Scrap Firm Expands

• • • **J. C. Rovensky,** chairman of the board, has announced the acquisition by Luria Steel & Trading Corp. of the Philip W. Frieder Co., Cleveland, and Erman Howell & Co., Inc., Chicago. Philip W. Frieder and Walter Erman have been elected vice-presidents and directors of Luria Steel & Trading Corp. and will remain in charge of Cleveland and Chicago operations respectively. C. H. R. MacKenzie, district manager of the Detroit office has been elected vice-president and director.

Dealer Rail Scrap Up

Washington

• • • **Sales of railroad** scrap prepared by a dealer or passing through a dealer's yard may be made at railroad scrap maximum prices if the seller complies with two requirements, OPA has announced. The requirements are that the seller warrants that the scrap sold is railroad scrap and also names the railroad from which the scrap originated.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Angles & splice bars	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
Rails 3 ft. and under	22.25*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 3 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
Nos. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast.	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast.	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast.	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$17.00 to $17.68
No. 1 hvy. melting	17.00 to 17.68
No. 2 hvy. melting	17.00 to 17.68
No. 2 bales	14.00 to 14.75
No. 3 bales	8.50 to 9.25
Mach. shop turn.	6.50 to 7.25
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00 to $17.68
No. 2 hvy. melting	17.00 to 17.68
No. 1 bales	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	8.00 to 9.00
Mach. shop turn.	7.00
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50*
No. 1 & No. 2 hvy. melting	14.50*
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	June 4, 1946	May 28, 1946	Apr. 30, 1946	June 5, 1945
Hot-rolled sheets	2.425	2.425	2.425	2.20
Cold-rolled sheets	3.275	3.275	3.275	3.05
Galvanized sheets (24 ga.)	4.05	4.05	4.05	3.70
Hot-rolled strip				
6-in. and under	2.45	2.45	2.45	2.10
Over 6 in.	2.35	2.35	2.35	2.10
Cold-rolled strip	3.05	3.05	3.05	2.80
Plates	2.50	2.50	2.50	2.25
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.25	$5.25	$5.25	$5.00
Tinplate, electro (0.50 lb)	4.75	4.75	4.75	4.50
Special coated mfg. ternes	4.55	4.55	4.55	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.50	2.50	2.50	2.25
Cold-finished bars	3.10	3.10	3.10	2.65
Alloy bars	2.808	2.808	2.808	2.70
Structural shapes	2.35	2.35	2.35	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.76	4.76	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.05	3.05	3.05	2.75
Wire nails	3.25	3.25	3.25	2.90
Rails: (dollars per net ton)				
Heavy rails	$43.39	$43.39	$43.39	$43.00
Light rails	49.18	49.18	49.18	45.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$39.00	$36.00
Sheet bars	38.00	38.00	38.00	36.00
Slabs, rerolling	39.00	39.00	39.00	36.00
Forging billets	47.00	47.00	47.00	45.00
Alloy blooms, billets, slabs	56.16	56.16	56.16	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.30	2.30	2.30	2.15
Skelp	2.05	2.05	2.05	1.90

Pig Iron: (per gross ton)	June 4, 1946	May 28, 1946	Apr. 30, 1946	June 5, 1945
No. 2 foundry, Phila.	$28.34	$28.34	$28.34	$26.84
No. 2, Valley furnace	26.50	26.50	26.50	25.00
No. 2, Southern, Cin'ti	26.94	26.94	26.94	25.44
No. 2, Birmingham	22.88	22.88	22.88	21.38
No. 2 foundry, Chicago†	26.50	26.50	26.50	25.00
Basic, del'd eastern Pa.	27.84	27.84	27.84	26.34
Basic, Valley furnace	26.00	26.00	26.00	24.50
Malleable, Chicago†	26.50	26.50	26.50	25.00
Malleable, Valley	26.50	26.50	26.50	25.00
L. S. charcoal, Chicago	42.34	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.00
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.50
Foundry coke, prompt	9.00	9.00	9.00	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	14.375	12.00	12.00	12.00
Copper, Lake	14.375	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	8.10	6.35	6.35	6.35
Aluminum, virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 4, 1946	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One week ago	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One month ago	2.72115¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One year ago	2.42471¢ per lb.	$24.61 per gross ton	$18.92 per gross ton

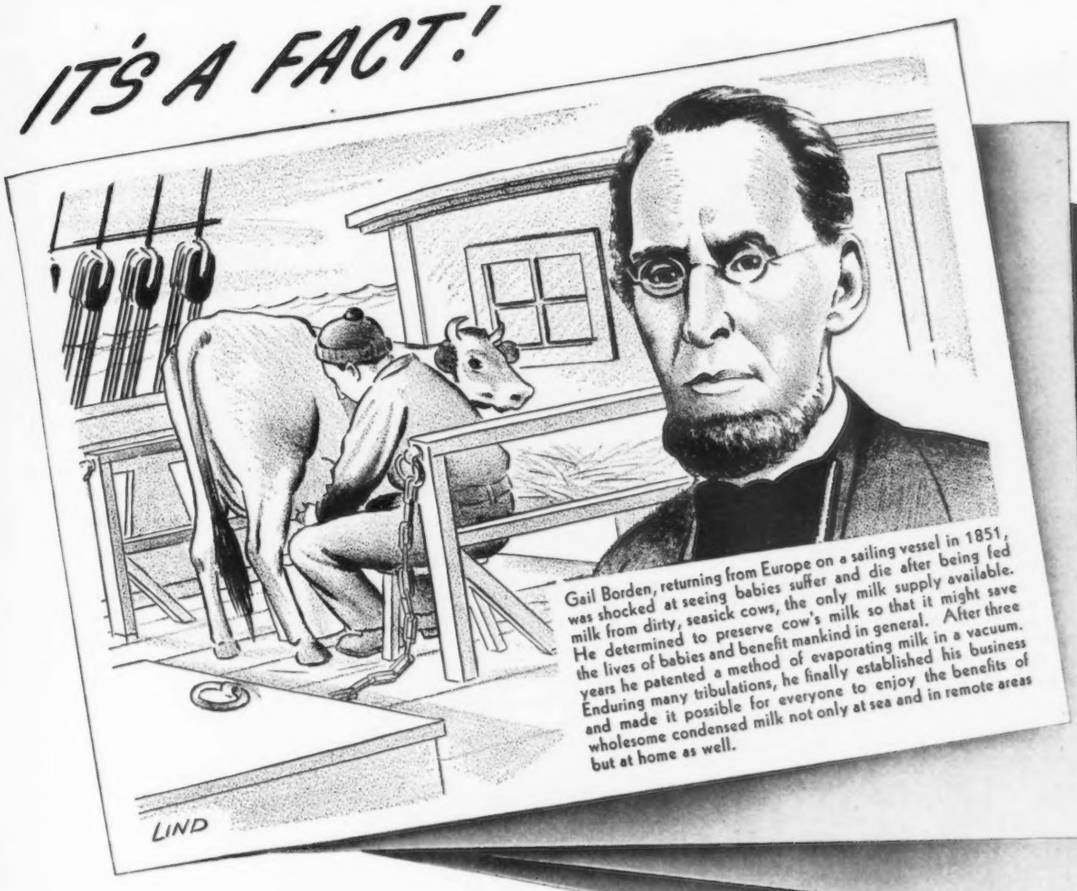
	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1946	2.72115¢ Apr. 2	2.54490¢ Jan. 1	$26.12 Mar. 19	$25.37 Jan. 1	$19.17	$19.17
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	$19.17 Jan. 2	$18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

IT'S A FACT!


Gail Borden, returning from Europe on a sailing vessel in 1851, was shocked at seeing babies suffer and die after being fed milk from dirty, seasick cows, the only milk supply available. He determined to preserve cow's milk so that it might save the lives of babies and benefit mankind in general. After three years he patented a method of evaporating milk in a vacuum. Enduring many tribulations, he finally established his business and made it possible for everyone to enjoy the benefits of wholesome condensed milk not only at sea and in remote areas but at home as well.
LIND

It's a better known fact

THAT J&L TIN MILL PRODUCTS HAVE THE QUALITIES THAT GIVE LONG SERVICE

The controlled temper and uniform gage of J&L Tin Mill Products make it possible for them to go through your shaping and forming operations with best results. Their superior surface improves the attractiveness of any product and provides excellent adhesion for lacquers, porcelain enamel and plastic coatings as well as lithographed and painted designs.

J&L Hot Dipped and Electrolytic tin plate and terne plate have the evenly distributed coatings necessary to make soldering operations go smoothly and to provide full protection for the desired service life.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Iron and Steel Prices...

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher. Alloy price increases are retroactive to Mar. 1.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$48.69	$48.69				$48.69	(Bethlehem, Massillon, Canton, Coatesville=$48.69)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$39	$39	$39	$39	$39	$39	$39	$39	(Provo=$50.20, Duluth=$41[14])			$51[14]	$41		
Carbon, forging billets	$47	$47	$47	$47	$47	$47	$47	(Provo=$58.20, Duluth=$49[14])				$59[14]	$49		
Alloy	$58.43	$58.43				$58.43	(Bethlehem, Massillon, Canton=$58.43)						$60.59		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton=$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville=2.05¢)						
WIRE RODS [15]															
No. 5 to 9/32 in.	2.30¢	2.30¢		2.30¢	2.30¢		(Worcester=2.40¢)				2.55¢	2.80¢			
SHEETS															
Hot-rolled	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.525¢	2.425¢		2.975¢	2.525¢	2.665¢	2.595¢
Cold-rolled [1]	3.275¢	3.275¢	3.275¢	3.275¢		3.275¢	3.275¢		3.375¢	3.275¢		3.925¢	3.375¢	3.615¢	3.595¢
Galvanized (24 gage)	4.05¢	4.05¢	4.05¢		4.05¢	4.05¢	4.05¢	4.05¢	4.15¢	4.05¢		4.60¢		4.29¢	4.22¢
Enameling (20 gage)	3.80¢	3.80¢	3.80¢	3.80¢			3.80¢		3.90¢	3.80¢		4.45¢	3.90¢	4.16¢	4.12¢
Long ternes [2]	4.05¢	4.05¢	4.05¢									4.80¢		4.41¢	4.37¢
STRIP															
Hot-rolled [3] 6 in. and under	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢		2.45¢			2.45¢		3.10¢	2.55¢	2.81¢	2.77¢
Hot-rolled [3] over 6 in.	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢		2.35¢			2.35¢		3.00¢	2.45¢	2.71¢	2.67¢
Cold-rolled [4]	3.05¢	3.15¢		3.05¢			3.05¢	(Worcester=3.25¢)					3.15¢	3.41¢	3.37¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.91¢	
Commodity cold-rolled	3.20¢	3.30¢		3.20¢			3.20¢	(Worcester=3.60¢)					3.30¢	3.56¢	
TINPLATE															
Standard cokes, base box	$5.25	$5.25	$5.25		$5.35			$5.35	$5.35					$5.604[11]	$5.53[11]
Electro, box 0.25 lb	$4.60	$4.60	$4.60					$4.70							
Electro, box 0.50 lb	$4.75	$4.75	$4.75					$4.85	$4.85						
Electro, box 0.75 lb	$4.90		$4.90					$5.00	$5.00						
BLACKPLATE															
29 gage [5]	3.30¢	3.30¢	3.30¢					3.40¢	3.40¢						3.57¢
TERNES, MFG.															
Special coated, base box	$4.55	$4.55	$4.55					$4.65	$4.65						
BARS															
Carbon steel	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	(Duluth=2.60¢) (Provo, Utah=3.20¢)			2.85¢	3.15¢	2.60¢	2.84¢	2.82¢
Rail steel [6]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢					2.85¢	3.15¢			
Reinforcing (billet) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢			2.70¢	2.75¢	2.45¢	2.59¢	2.67¢
Reinforcing (rail) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢				2.70¢	2.75¢	2.45¢		2.57¢
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢	(Detroit=3.15¢) (Toledo=3.25¢)							3.44¢	3.42¢
Alloy, hot-rolled	2.92¢	2.92¢				2.92¢	2.92¢	(Bethlehem Massillon, Canton=2.92¢)					3.03¢		
Alloy, cold-drawn	3.62¢	3.62¢	3.62¢	3.62¢		3.62¢							3.73¢		
PLATE								(Coatesville and Claymont=2.50¢, Provo, Utah=3.20¢)							
Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢			2.85¢	3.05¢	2.72¢	2.69¢	2.55¢
Floor plates	3.75¢	3.75¢									4.10¢	4.40¢		4.11¢	4.07¢
Alloy	3.79¢	3.79¢			(Coatesville=3.79¢)						4.27¢	4.49¢		4.00¢	3.88¢
SHAPES															
Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Bethlehem=2.35¢)				2.60¢	3.00¢		2.52¢	2.465¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester=3.20¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester=3.15¢) (Duluth=3.10¢)					3.55¢			3.37¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.00¢	4.00¢		4.00¢			(Worcester=4.10¢)					4.50¢			4.32¢
PILING															
Steel sheet	2.65¢	2.65¢				2.65¢						3.20¢			2.97¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt.	38.95	36.79	28.67	31.38	35.16	38.49
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Newark, N. J., Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	72.09	72.09	.....	68.49	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., net ton	$43.39
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	*per net ton*
Light rails (from billets)	$49.18
Light rails (from rail steel)	49.18
	base per lb
Cut spikes	3.65¢
Screw spikes	5.55¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. •Also Canton, O.)

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium•	43¢
Oil hardening•	24¢
Special carbon•	22¢
Extra carbon•	18¢
Regular carbon•	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	21.00•	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.72	....
Inconel-clad		
10 pct, f.o.b. Coatesville	26.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.96	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

•Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	base per keg	
Standard wire nails	$3.25	$3.75
Coated nails	3.25	3.75
Cut nails, carloads	3.85	....
	base per 100 lb	
Annealed fence wire	$3.50	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence•	72	90
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire••	79	89
Twisted barbless wire	79	89

•15½ gage and heavier. ••On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50c a ton.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$8.50	$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms and Slabs	Bars and Bar-strip	Billets, Blooms and Slabs
NE 8600	0.676¢	$13.52	1.196¢	$23.92
NE 8700	0.728	14.56	1.248	24.96
NE 9400	0.780	15.60	1.300	26.00
NE 9700	0.676	13.52	1.196	23.92
NE 8800	1.352	27.04	1.872	37.44
NE 9900	1.248	24.96	1.612	32.24

The extras shown are in addition to the base price of $2.92 per 100 lb on finished products and $58.43 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.27¢ per lb for bars and bar-strip and $5.14 per gross ton for billets, blooms and slabs. Alloy price increases are retroactive to Mar. 1.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
½-in.	60½	48
¾-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

½-in.	18	+4
¾-in.	24	2½
1-in. and 1¼-in.	28½	9
1½-in.	33	12
2-in.	32	11

Steel (lapweld)

2-in.	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	25	4½
2½-in. to 3½-in.	26	7
4-in.	28	11
4½-in. to 8-in.	27	10

Steel (butt, extra strong, plain ends)

½-in.	58½	47½
¾-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

½-in.	19	+1½
¾-in.	25	4½
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28	8½
2½-in. to 4-in.	34	16
4½-in. to 6-in.	32	14½

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.67
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over.....Base
30,000 lb or ft to 39,999 lb or ft.... 5 pct
20,000 lb or ft to 29,999 lb or ft.... 10 pct
10,000 lb or ft to 19,999 lb or ft.... 20 pct
5,000 lb or ft to 9,999 lb or ft.... 30 pct
2,000 lb or ft or 4,999 lb or ft.... 45 pct
Under 2,000 lb or ft..... 65 pct

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.. $60.80
6-in. and larger, del'd New York... 60.20
6-in. and larger, Birmingham..... 52.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle 74.00

For all rail shipment; rail and water shipment less.

Class "A" and gas pipe, $3 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

An increase of 7 pct applies to all listings.

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter...65½
9/16 & ⅝ in. x 6 in. & shorter.....63½
¾ to 1 in. x 6 in. & shorter.....61
1¼ in. and larger, all lengths.....59
All diameters over 6 in. long.....59
Lag, all sizes.....62
Plow bolts.....65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller.....62
9/16 to 1 in. inclusive.....59
1⅛ to 1½ in. inclusive.....57
1⅝ in. and larger.....56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts

Consumer

Packages, nuts loose.....71 and 10
In packages.....71
In bulk.....80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....$3.75

Small Rivets
(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....65 and 5

Cap and Set Screws *Percent Off List*

Consumer

Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.....64
Upset set screws, cup and oval points 71
Milled studs.....46
Flat head cap screws, listed sizes.....36
Fillister head cap, listed sizes.....51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50..... $4.95
Old range, non-bessemer, 51.50.. 4.80
Mesaba, bessemer, 51.50..... 4.70
Mesaba, non-bessemer, 51.50.. 4.55
High phosphorus, 51.50..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Brass, minus 100 mesh.....18.5¢ to 20.25¢
Copper, electrolytic, 150 and 200 mesh.....21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh.....20½¢ to 25½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe.....11¢ to 16¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots.....4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots.....63¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe 27¢ to 42¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe.....31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe.....90¢
Aluminum, 100 and 200 mesh.....*25¢
Antimony, 100 mesh.....30¢
Cadmium, 100 mesh.....$1.40
Chromium, 100 mesh and finer.....$1.25
Lead, 100, 200 & 300 mesh.....11½ to 15¢
Manganese, minus 325 mesh and coarser.....44¢ to 61¢
Nickel, 150 mesh.....51½¢
Silicon, minus 325 mesh and coarser.....26¢ to 55¢
Solder powder, 100 mesh..8½¢ plus metal
Tin, 100 mesh.....58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb.....$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb..$2.60
Under 100 lb.....$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, deld	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	13.75†
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $14.25 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Per 1000

Super-duty brick, St. Louis.....$76.05
First quality, Pa., Md., Ky., Mo., Ill., Ohio.....60.40
First quality, New Jersey.....65.90
Sec. quality, Pa., Md., Ky., Mo., Ill.....54.80
Sec. quality, New Jersey.....57.70
Sec. quality, Ohio.....52.95
Ground fire clay, net ton, bulk.....8.95

Silica Brick*

Pennsylvania and Birmingham.. $60.40
Chicago District.....69.30
Silica cement, net ton (Eastern).....10.60

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Plymouth Meeting, Chester.....$54.00

Magnesite Brick

Standard, Balt. and Chester.....$76.00
Chemically bonded, Baltimore.....65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads).....$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk.....22.00
in sacks.....26.00

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
				Hot-Rolled										
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	6 in. and Under	Over 6 in.	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 8742-50 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 8742-50 Ann.
**Philadelphia	$3.743	$5.097	$5.218a	$4.272	$4.172	$5.022	$3.855	$3.916	$4.072	$4.522	$6.016	$7.218	$7.372	$8.522
New York	3.815	4.838[3]	5.46	4.324	4.224	5.024	4.018	4.008	4.103	4.553	6.058	7.158	7.403	8.453
Boston	3.999	4.969[9]	5.674	4.456	4.356	4.965	4.162	4.162	4.294	4.594	6.212	7.312	7.444	8.494
Baltimore	3.619	5.077	5.344	4.252	4.152	....	3.844	4.009	4.052	4.502	....	....	....	....
Norfolk	3.996	....	5.821	4.515	4.415	....	4.221	4.252	4.315	4.615	....	....	....	....
Chicago	3.475	4.425	5.581	3.95	3.85	4.90[17]	3.80	3.80	3.75	4.20	....	....	....	....
Milwaukee	3.612	4.562[3]	5.537	4.087	4.077	5.037[17]	3.937	3.937	3.887	4.337	6.037	7.037	7.187	8.237
Cleveland	3.575	4.625	5.327	3.95	3.85	4.70[17]	3.65	3.838	3.60	4.20	6.006	....	6.95	....
Buffalo	3.575	4.625	5.104/5.20	4.169	4.069	4.919	3.88	3.65	3.60	4.20	5.80	6.90	7.95	8.00
Detroit	3.675	4.725	5.45	4.05	3.95	....	3.859	3.911	3.70	4.25	6.13	....	7.259	....
Cincinnati	3.65	4.70[3]	5.275	4.025	3.925	4.961	3.911	3.941	3.861	4.461	6.15	....	7.311	....
St. Louis	3.622	4.572[3]	5.581	4.097	3.997	5.181[17]	3.947	3.947	3.897	4.481	6.181	....	7.331	....
Pittsburgh	3.575	4.625	5.20	3.95	3.85	....	3.65	3.65	3.60	4.20	....	....	....	....
St. Paul	3.797	4.747	5.635	4.272	4.172	5.352	4.122	4.122	4.072	4.811	....	....	....	....
Omaha	4.018	5.668	5.965	4.343	4.243	....	4.343	....	4.293	4.893	....	....	....	....
Indianapolis	3.745	4.795	5.37	4.12	4.02	4.99	3.88	3.88	3.83	4.43	6.13	....	7.28	....
Birmingham	3.675	....	5.20	....	....	....	3.80	3.80	3.75	4.303	....	....	....	....
Memphis	4.19	4.885	5.715	4.565	4.465	....	4.315	4.315	4.265	4.78	....	....	....	....
New Orleans	4.283*	5.304	5.808	4.658	4.558	....	4.408	4.408*	4.358*	5.079	....	....	....	....
Houston	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Los Angeles	4.70/5.00	6.80/7.20[3]	6.55	4.95	4.85	....	4.80/4.95	4.45/4.65	4.40/4.55	5.693/6.03	....	....	....	....
San Francisco	4.12	6.87	6.35	4.60	4.50	4.15	4.15	....	4.30	5.78	....	....	....	....
Seattle	4.87[12]	7.27[4]	6.40	4.60	4.50	....	5.00[12]	4.70[12]	4.60[12]	6.23	....	....	....	....
Portland	4.87[11]	6.82[4]	6.20	5.10	5.00	....	5.00[11]	4.70[11]	4.70[11]	5.98	8.15	....	9.20	....
Salt Lake City	4.75	....	6.62[18]	5.88	5.78	....	5.23[18]	5.23[18]	5.13	6.35	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

* Add 0.271¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, effective Mar. 15, 1946.
Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	27.00	27.50	28.00	28.50	....
Birdsboro	27.00	27.50	28.00	28.50	32.00
Birmingham	21.50	22.88	....	27.50	....
Buffalo	25.50	26.50	27.00	27.50	32.00
Chicago	26.00	26.50	26.50	27.00	....
Cleveland	26.00	26.50	26.50	27.00	....
Detroit	26.00	26.50	26.50	27.00	....
Duluth	26.50	27.00	27.00	27.50	....
Erie	26.00	26.50	27.00	27.50	....
Everett	27.00	27.50	28.00	28.50	....
Granite City	26.00	26.50	26.50	27.00	....
Hamilton	26.00	26.50	26.50	....	....
Neville Island	26.00	26.50	26.50	27.00	....
Provo	24.00	24.50	....	....	....
Sharpsville[1]	26.00	26.00	26.50	27.00	....
Sparrows Point	27.00	27.50	....	....	....
Steelton	27.00	....	....	....	32.00
Swedeland	27.00	27.50	28.00	28.50	....
Toledo	26.00	26.50	26.50	27.00	....
Youngstown	26.00	26.50	26.50	27.00	....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	0.50	27.50	28.00	28.50	29.00	....
Boston	Birdsboro-Steelton	4.02	....	....	....	....	38.02
Brooklyn	Bethlehem	2.50	29.50	30.00	30.50	31.00	....
Brooklyn	Birdsboro	2.92	....	....	....	....	34.92
Canton	Clev, Ygstn, Sharpsvil.	1.39	27.39	27.89	27.89	28.39	....
Canton	Buffalo	3.19	....	....	....	....	35.10
Cincinnati	Birmingham	4.06	25.56	26.94	....	....	....
Cincinnati	Hamilton	1.11	....	....	27.61	....	....
Cincinnati	Buffalo	4.40	....	....	....	....	36.40
Jersey City	Bethlehem	1.53	28.53	29.03	29.53	30.03	....
Jersey City	Birdsboro	1.94	....	....	....	....	33.94
Los Angeles	Provo	4.95	28.95	29.45	....	....	....
Los Angeles	Buffalo	15.41	....	....	....	....	47.41
Mansfield	Cleveland-Toledo	1.94	27.94	28.44	28.44	28.94	....
Mansfield	Buffalo	3.36	....	....	....	....	35.38
Philadelphia	Swedeland	0.84	27.84	28.34	28.84	29.34	....
Philadelphia	Birdsboro	1.24	....	....	....	....	33.24
San Francisco	Provo	4.95	28.95	29.45	....	....	....
San Francisco	Buffalo	15.41	....	....	....	....	47.41
Seattle	Provo	4.95	28.95	29.45	....	....	....
Seattle	Buffalo	15.41	....	....	....	....	47.41
St. Louis	Granite City	0.50	26.50	27.00	27.00	27.50	....
St. Louis	Buffalo	7.07	....	....	....	....	39.07

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10, Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorous content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$32.00: f.o.b. Buffalo—$33.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed.

96-98% Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32¢
Ton lots	34¢
Less ton lots	36¢

Low-Carbon Ferromanganese

Contract price per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10 max. C, 0.06% P, 90% Mn	21.00¢	21.40¢	21.65¢
0.10% max. C	20.50¢	20.90¢	21.15¢
0.15% max. C	20.00¢	20.40¢	20.65¢
0.30% max. C	19.50¢	19.90¢	20.15¢
0.50% max. C	19.00¢	19.40¢	19.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢	16.65¢

Silicomanganese

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
Ton lots	6.70¢
Briquet, contract basis, carlots, bulk, freight allowed, per lb of briquet	5.80¢
Ton lots	6.30¢
Less ton lots	6.55¢

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $48.75 f.o.b. Keokuk, Iowa; $46.75 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

Contract price per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

Contract price per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination. 40% Si.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
Ton lots	3.80¢	4.20¢	4.25¢

Electric Ferrosilicon

Contract price per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	20.50¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

Briquets—contract price per pound of briquet, f.o.b. shipping point, freight allowed. 60% chromium.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66.71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	14.00	14.40	15.00
Ton lots	14.00	15.55	16.75
Less ton lots	15.40	16.05	17.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices per pound, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot	45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.85¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00¢	12.75¢	14.75¢
Less ton lots	12.50¢	13.25¢	15.25¢

Alloy 5: 50-56% Cr, 4-6% Mn, 13-50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	11.75¢	12.50¢	14.50¢
Less ton lots	12.25¢	13.00¢	15.00¢

SMZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00¢	12.85¢	14.60¢
Less ton lots	12.50¢	13.35¢	15.10¢

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.25
Less ton lots	$2.30
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carloads lots	14¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	5.75¢
Ton lots	7.25¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	25¢
Ton lots	26¢
Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	58¢
Ton lots	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢

New Center for Screw Machine Technology Scheduled for Fall

Cleveland

• • • **Establishment of a $200,000** training center for screw machine technology at the Rochester Institute of Technology as a cooperative enterprise of the National Screw Machine Products Assn. and RIT, will get underway next fall, according to a joint announcement by Dr. Mark Ellington, president of RIT, and Orrin B. Werntz, executive secretary of NSMPA.

Orrin B. Werntz

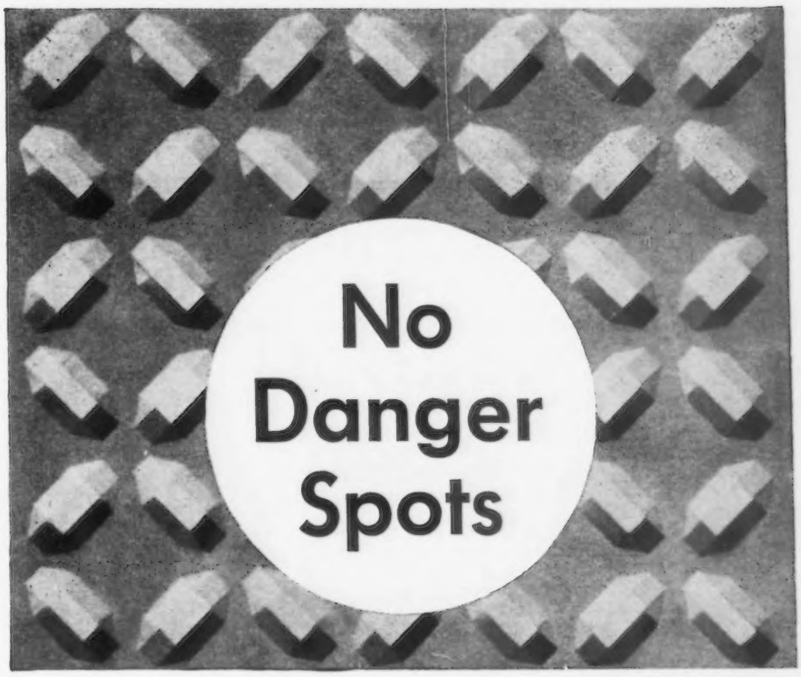
The new center will be set up as a division of RIT's mechanical department, and with the recommendations of NSMPA's educational committee, RIT will lay out a 3 yr cooperative course in screw machine technology and a series of specialized short courses ranging from one to six weeks.

NSMPA members, under certain conditions, will be given first opportunity to use the center's facilities and will receive first notification of unattached graduates. The center will be available also to the association and its members for research activities.

RIT has a completely equipped mechanical department with lathes, milling machines, tool room equipment, all necessary for second operation. The screw machine department, consisting of single and multiple spindle automatic screw machines, will be equipped with the assistance of a number of machine tool builders who have already taken preliminary steps to support the project. Machine tools not so supplied will be secured from the government. Verne McDonald is head of the new department.

Administration of the center will be vested in RIT, with NSMPA's education committee functioning as a permanent body with subcommittees on machine tools and supplies, admissions and curriculum. RIT will issue a diploma to students

(CONTINUED ON PAGE 144)

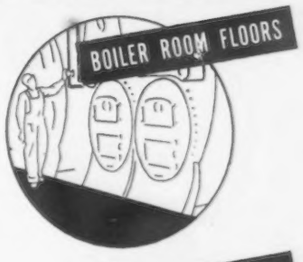


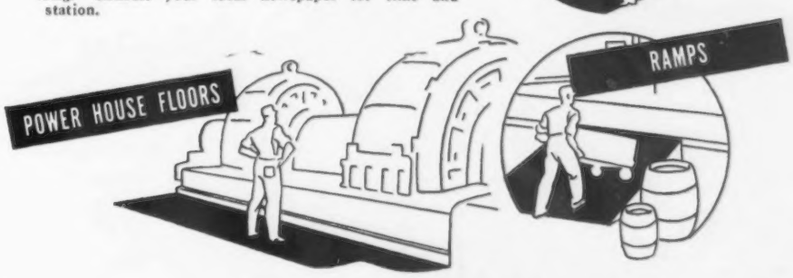
ON small step plates and on factory floors, U·S·S Multigrip Floor Plate brings safe, sure footing to workers in all sorts of plants. Multigrip protects your workers from injuries due to skids, slips and falls, your floors from the wear and tear of plant traffic.

The scientific, patented design in which the flat-top risers are arranged insures resistance to slipping from all directions. Comfortable, too, for workers' feet, Multigrip Floor Plate reduces accident-causing fatigue. There are no pockets to accumulate dirt and grease, to hold water, to catch vehicle wheels.

Quickly and easily installed, U·S·S Multigrip Floor Plate adds structural strength, insures longer repair-free life for wood and concrete floors on which it is laid.

LISTEN TO . . . the "Hour of Mystery" presented by United States Steel on the radio every Sunday evening. Consult your local newspaper for time and station.





U·S·S MULTIGRIP FLOOR PLATE

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

THE JOB Stainless steel is difficult to mill under almost any circumstances — but this super-powered CSM, equipped with the proper cutter, literally "walked through" this job.

OPERATION:	Rough Mill Stud	DEPTH OF CUT:	.441" (Max.)
MATERIAL:	Stainless Steel	SURFACE SPEED:	346 SFM
CUTTER:	6" Dia.; 8 Tooth	FEED PER TOOTH:	.020"
TABLE FEED:	21 IPM	MILLING TIME:	26 Seconds

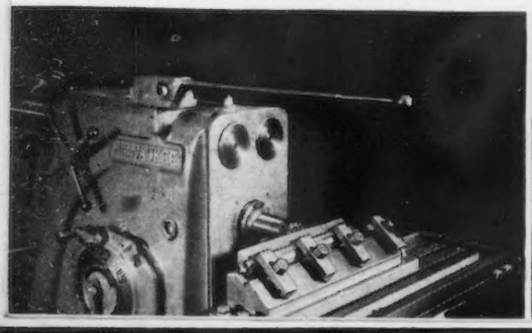
THE PART

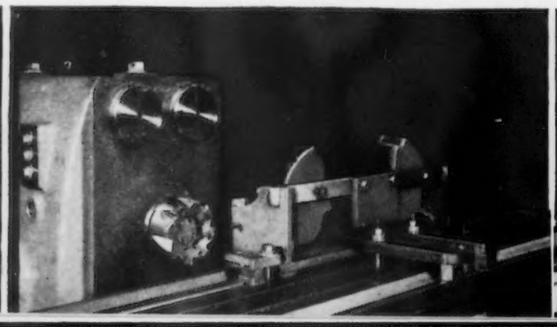
Note the excellent finish obtained despite the high rate of metal removal. The milling time of 26 seconds includes both surfaces. Micrometer stop dial indicator on machine facilitated this step milling operation.

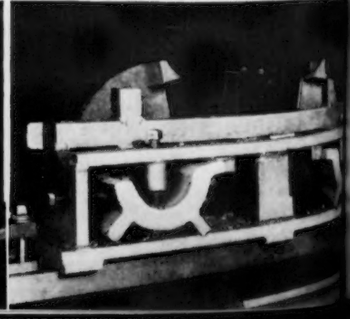
MORE EXAMPLES OF CSM PERFORMANCE

Operation: Rough mill angle on knee gib support—with 34% time reduction. Material: C. I.—Speed: 336 sfm—Cutter: 3" dia., 8 T.—Feed per tooth .010"—Depth of Cut: 5/32". Previous Milling time: 61 seconds — CSM Milling time: 45 seconds.

Two views of set up for milling socket arm part with 65% milling time reduction. Center s rear of special holding fixture in place on machine table. At right, machined surfaces of Material: Cast Steel—Surface Speed: 346 sfm—Cutter: 6" dia., 8 Tooth—Feed per tooth: —Depth of cut ¼". Previous milling time: 4 min. 52 seconds—CSM milling time: 1 min. 42







STAINLESS STEEL MILLING

made easy on a
KEARNEY & TRECKER CSM

CSM Milling Machines were designed to obtain the greatest benefits from modern cutting tools, and are now part of our line of standard models. The design has been stabilized after complete analysis of industry's problems of milling with carbide cutters.

Because they are knee type machines, they are readily adaptable to a great variety of work. They are precision built in accordance with long established Kearney & Trecker standards and will cut metals faster and to finer tolerances and superior finishes than ever before — with high speed steel cutters as well as carbide cutters.

CSM machines are available in 20, 30 or 50 H.P. models in both plain and vertical knee types.

Write for complete data on CSM machines — CATALOG CSM-20. Please indicate your business connection.

30 HP Plain CSM

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

"Be ready for tomorrow with CSM's"

ARMSTRONG

Quality WRENCHES

These fine wrenches combine balance with great strength. Accurate openings assure a positive grip on screw head or nut. Engineered designs give increased leverage and applied power. The finest wrench steels, drop forged, heat treated, tempered and tested, give extra strength . . . superior "tool sense" has created a line of superior wrenches.

ARMSTRONG Wrenches are cataloged, stocked and sold by leading distributors everywhere.

OPEN END
Droped Forged
Carbide Steel

OPEN END
Drop Forged
Alloy Steel

BOX SOCKET
Drop Forged
Alloy Steel

COMBINATION WRENCHES
Open End and Box Socket Drop Forged, Alloy Steel

CONSTRUCTION AND STRUCTURAL WRENCH—Both Carbon Steel and Alloy Steel

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. Francisco Ave., Chicago 12, U. S. A.

Eastern Whse. and Sales:
199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Office:
1275 Mission St., San Francisco 3, Calif.

DETACHABLE SOCKET SETS
Drop Forged Ratchets
Alloy Sockets

completing the 3 yr cooperative courses which are open to high school graduates and non-graduate veterans able to pass classification and ability tests. Those attending short-term or specialized courses are accepted solely upon recommendation of their employers.

RIT has agreed to provide, in quarters now being used by its machine shops, 5000 sq ft of floor space for installation of the screw machine department. A director and instructors for the department will also be provided by RIT, which will make its general and related educational facilities available in maintaining the curricula of the new division.

RIT will provide initially for 30 to 60 3-yr students, and for a maximum of 180 at the beginning of the third year. In addition, it will undertake the training of 200 to 400 students in short-term, specialized courses.

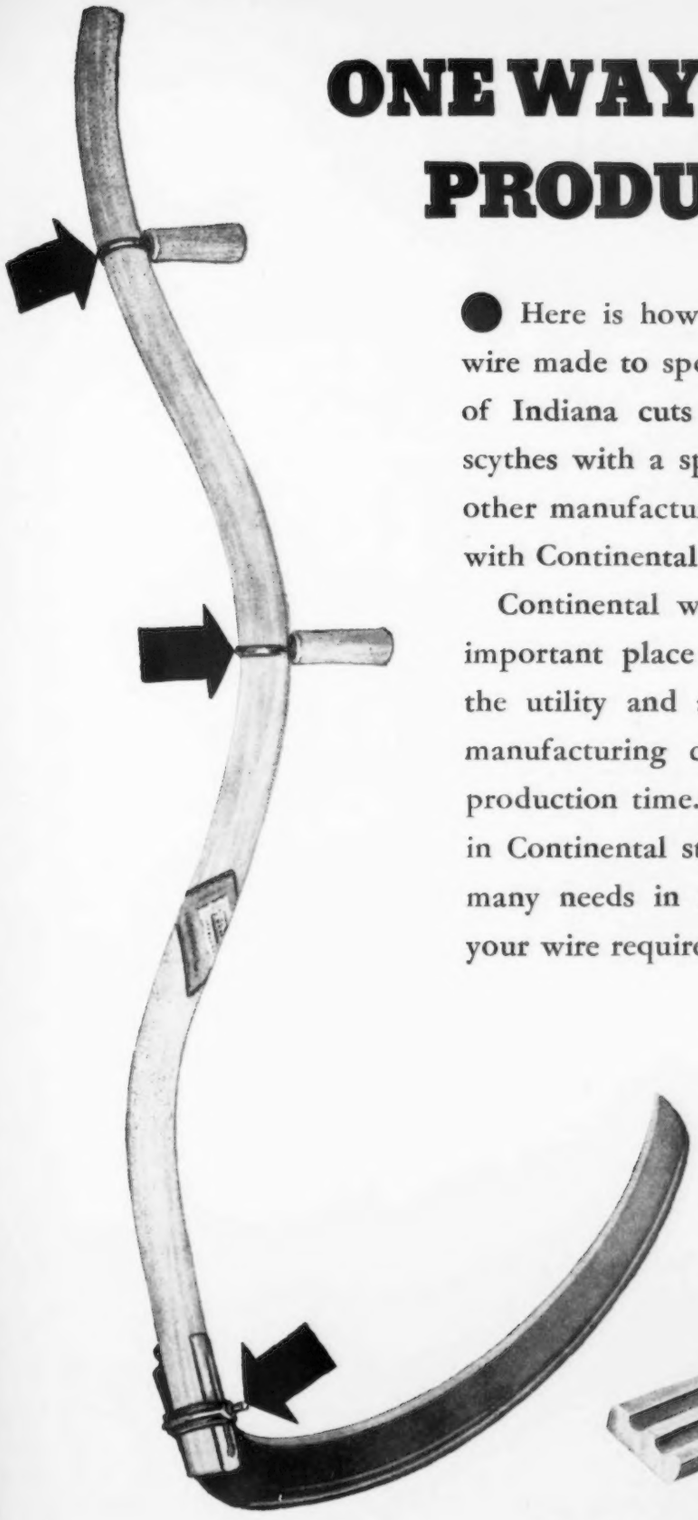
F. C. Phillips

The new project is the outgrowth of study by NSMPA's educational committee, set up by the board of directors last December, of the needs of the screw machine products industry for such a center, and of conferences with RIT officials and surveys of its facilities.

The educational committee, in its preliminary report pointed out that the industry, during its 50 yr history, never has had a training center of any description under which it could initiate its own research work. The committee's report further emphasized that the industry is primarily composed of small companies which have been forced to follow "on the job" methods in training employees, with the result that such training has been incomplete and costly in point of time consumed.

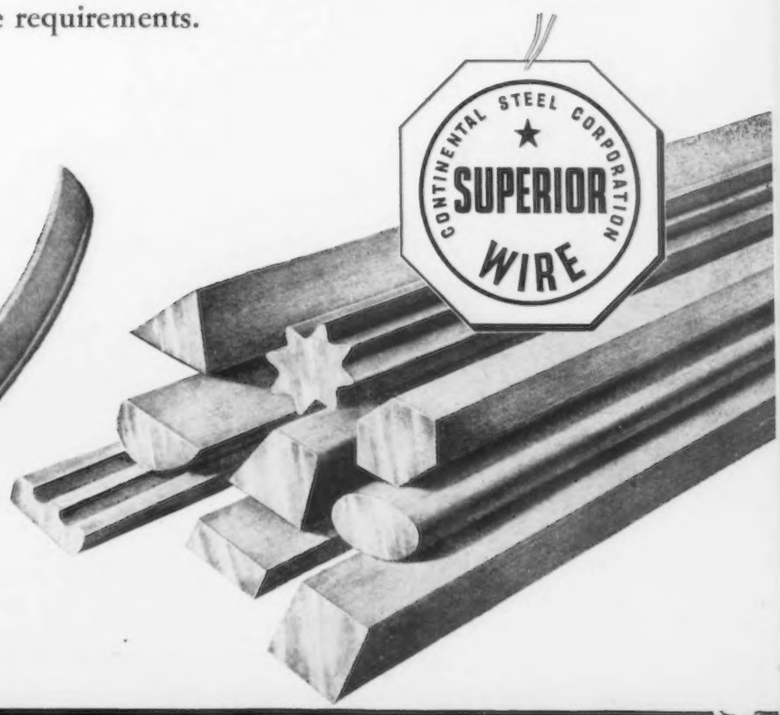
"No training has been available on either specialized subjects or matters related to the production of screw machine products, in actually dealing with screw machine operation," the report states. "No center has ever been available for the general pooling of training ideas,

ONE WAY TO "CUT DOWN" PRODUCTION COSTS



● Here is how one manufacturer uses Continental wire made to special shapes. Sta-tite Snath Company of Indiana cuts production costs of their line of scythes with a specially-shaped half oval wire. Many other manufacturers are obtaining similar advantages with Continental shaped wire.

Continental wire drawn to special shapes has an important place in modern production. It adds to the utility and appearance of many products, cuts manufacturing costs and frequently saves valuable production time. There is a size, a type, and a finish in Continental standard or special shaped wire to fit many needs in manufacture. Write us today about your wire requirements.



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PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized. KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

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by PERKINS

Perkins is primarily known for its recognized ability to produce finished gears of extreme accuracy which meet the standards of the products for which they are made.

Perkins has the necessary facilities and skills to produce such gears in any quantity and to meet any specifications and delivery dates previously agreed upon

For prompt action on gear estimates and gear production, consult with us now.

PERKINS MAKES: Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Spur Gears, Ground Thread Worms

PERKINS WORKS IN ALL MATERIALS: Cast Iron, Steel, Bronze, Brass, Aluminum, Stainless Steel, Cast Alloys, Monel Metal and Non-Metallic Compounds or Compositions

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SPRINGFIELD 2, MASS.

Precision, custom-cut

PERKINS SERVICE

to the advantage of association members and the general welfare of the industry."

The report further states: "It is the committee's opinion that its proposal (for the establishment of the center) will rectify this situation and will result in one more step forward in the advancement of the industry, resulting in the long run in better operators, better supervisors, additional technical knowledge and consequent decreased costs."

NSMPA's educational committee will include, along with Fred C. Phillips, president of the association and president of the F. C. Phillips Co., Stoughton, Mass., and Mr. Werntz, C. A. DuBois, training director, Scovill Mfg. Co., Waterbury, Conn.; T. M. Leisle, general manager, Automatic Screw Machine Products Co., Milwaukee; C. E. Lucas, president, Lucas Screw Products, Inc., Rochester; Ted Lundberg, secretary and sales manager, Lundberg Screw Products, Lansing, Mich.; R. D. Perry, president, Perry Fay Co., Elyria, Ohio; John R. Cox, president, Balas Collet Co., Cleveland; E. W. Schneider, secretary-general manager, Hudson Screw Machine Products Co., Chicago; and T. L. Strimple, secretary and assistant treasurer, National Acme Co., Cleveland. Subcommittees have not been designated.

Alcoa Rebuilds Foundry

Pittsburgh

• • • **The Bridgeport** Works of U. S. Aluminum Co., subsidiary of Aluminum Co. of America, which has been virtually shut down since VJ-Day, is to be re-equipped to supply present time markets according to C. H. DeLamather, plant manager. The new equipment to be installed at a cost of nearly $2 million dollars, will permit the works to produce on a larger scale aluminum sand castings and aluminum permanent and mold castings.

Until recently, the Bridgeport foundry products were predominantly sand castings, but the introduction of permanent mold work is being expanded in the new program. It is expected that the expanded operations at Bridgeport will employ about 1500 persons, which is just about double former peak time employment levels.

Notes on
STEEL CASTINGS

HALF THERE IN SIZE, BUT
ALL THERE IN QUALITY

This huge electrical generator casting weighs about 40,000 pounds. It's only half of the "spider" on which the windings go, but the casting *quality* is no half measure. PSF's controlled methods and advanced technique assure uniform strength, correct grain structure and complete fidelity to "specs"... complete *satisfaction* for any steel casting user.

48 YEARS OF STEEL CASTING KNOWLEDGE

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STEEL FOUNDRY CORPORATION
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Sales Offices: NEW YORK · PHILADELPHIA · CHICAGO · CLEVELAND · CINCINNATI · AKRON · WASHINGTON

Life of Rolling Mill Wearing Parts Increased 6 to 8 Fold by Conservation Welding...

Rolling mill coupling boxes, spindles and crabs, whether made of manganese steel or carbon steel, are given added service life, and replacement cost figures for these members are substantially reduced through the application of Amsco Welding Products.

The coupling box shown in Picture A-484, which is cast of austenitic manganese steel, is being built up with Amsco Nickel-Manganese Steel Welding Rod. Obviously, it is quite difficult to grind the surface of the deposited weld metal due to the cramped quarters inside a coupling box. But the fact that manganese steel work hardens and polishes while the coupling box is in service, minimizes the necessity of finishing, grinding or peening. This is especially true if the wabblers of the opposing spindle, crab or roll, as that shown in Picture A-485, are built up or hardfaced with Amsco Economy Hardface.

The ground surface of Amsco Economy Hardface, being slightly harder than work-hardened manganese steel and having a Brinell hardness of between 450 and 550, takes on a high polish, with the result that very little friction is set up between it and the Nickel-Manganese Steel surface, which work hardens to between 400 and 500 Brinell.

Picture A-486 shows an ordinary carbon steel tight crab that has been built up with Amsco Nickel-Manganese Steel electrodes. At another rolling mill, the superintendent states that it is standard practice to purchase ordinary carbon steel crabs and build them up with Nickel-Manganese Steel after they have become worn, and that they obtain six to eight times as much service life from wabblers reconditioned with Nickel-Manganese Steel rod as from carbon steel.

Send us your problem for the application of Amsco Welding Products to the reclamation, hard surfacing and repairing of ferrous equipment parts.

•

(Amsco Welding Products are produced and sold in Canada by Canadian Ramapo Iron Works, Inc., Niagara Falls, Ontario.)

•

AMSCO
Foundries at
Chicago Heights, Ill.; New Castle, Del.;
Denver, Colo.; Oakland, Calif.;
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Offices in Principal Cities
AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS • ILLINOIS
AMERICAN Brake Shoe COMPANY

Report Indicates Some Production Gains In Jap Industrial Works

Washington

• • • **Slow and difficult** though it is, General MacArthur has reported slight improvement in the industrial situation in Japan and Korea. In his summary for March he said that in Japan there was a general advance on the economic front where production gains were registered in "almost every manufacturing and textile industry."

Production, however, was still reported to be far below minimum requirements and normal plant capacity. It was increasingly plagued by stringent shortages of raw materials and food for industrial workers.

Coal production was estimated as 5 pct above the February figure but was seriously impeded by strikes which hit four of the largest companies in the second week of the month. Metal mines showed small output, primarily because of deterioration of equipment and lack of coal for smelters, but rehabilitation or installation of new equipment was found to have started in some mines. Other deterrents to production were shortages of labor and food and low metal prices.

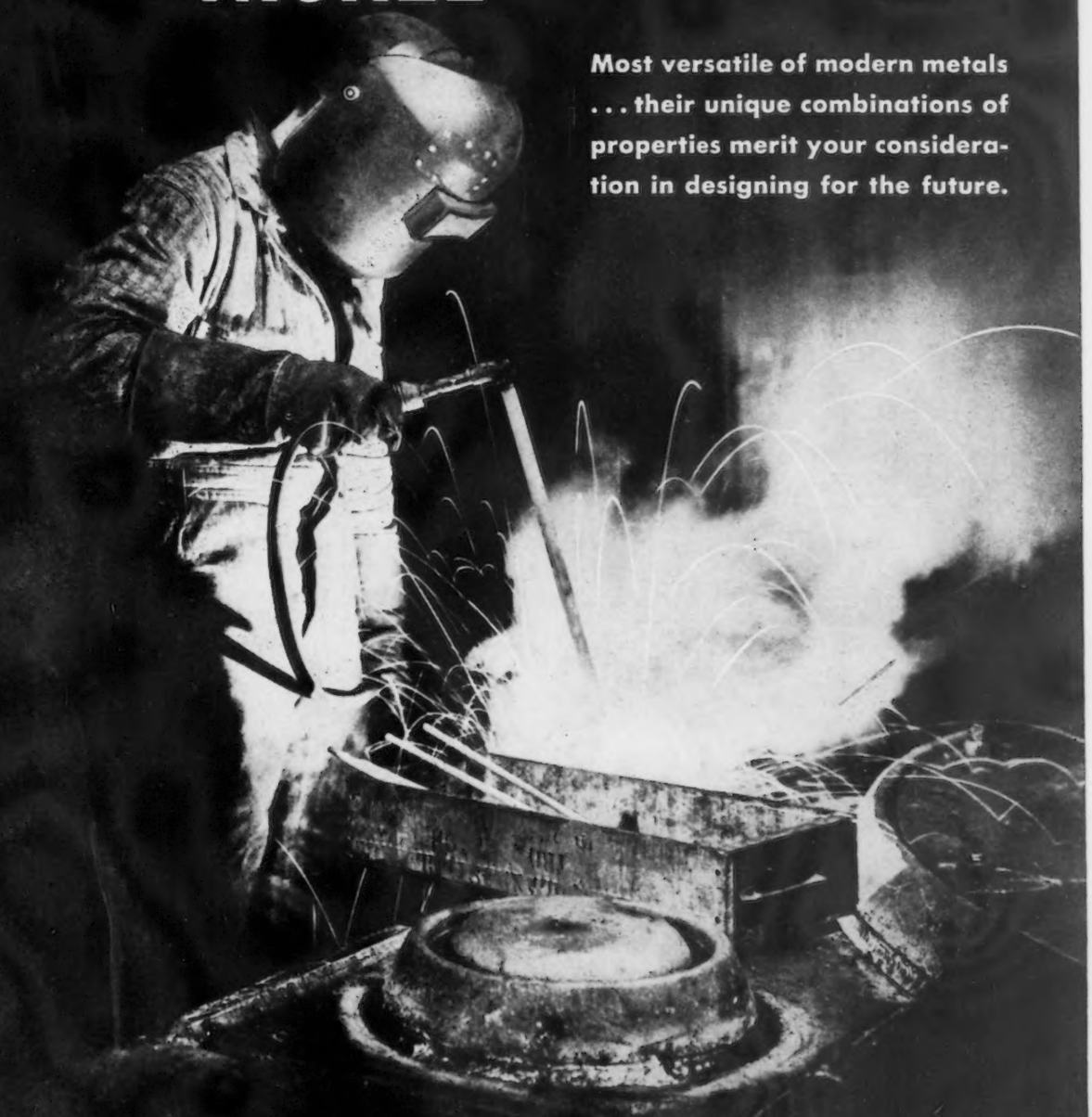
Increased coal deliveries contributed to a rise in steel and textile production and a 150 pct jump in glass manufacture. Aluminum output rose about 150 pct, steel and lead 100 pct and zinc 50 pct.

Emphasis on maintaining machinery for possible use as reparations in a good state of repair was further stressed, the summary said, by the need for quickly bringing the cotton, textile and silk industries to a point where they might meet anticipated demands. Although there was more activity in the machinery industries during the month, manufacturers were reported as still reluctant to commit their resources and efforts to new production until reparations removals are announced.

Shortages of transportation, coal and raw materials which were the chief deterrents to Korean manufacture eased in varying degrees during March.

CHROMIUM-NICKEL AUSTENITIC STAINLESS STEELS

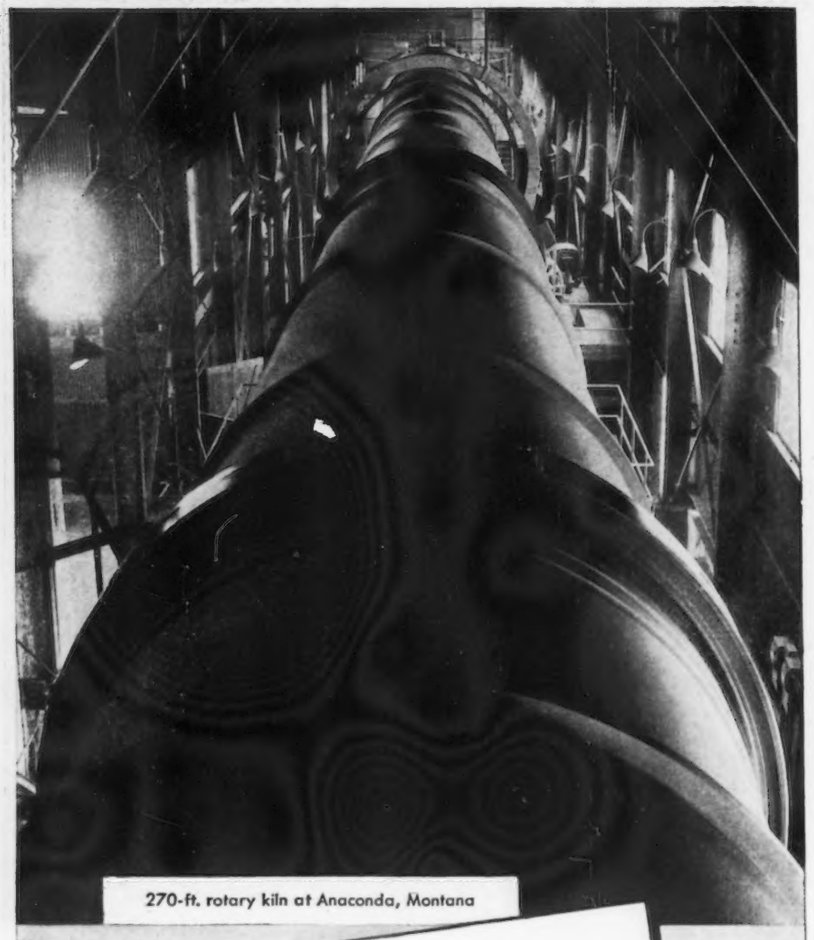
Most versatile of modern metals . . . their unique combinations of properties merit your consideration in designing for the future.



STAINLESS STEEL ARC WELDING ELECTRODES containing Nickel are used extensively for joining heavy alloy steel plates to avoid brittleness in the weld. Here an operator is using a half inch stainless steel electrode in such a welding operation.

International Nickel are miners, smelters, and refiners of Nickel, an important ingredient in the chromium-Nickel austenitic stainless steels. Although they do not produce these stainless steels, a list of the sources of supply will be furnished on request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, NEW YORK 5, N. Y.



270-ft. rotary kiln at Anaconda, Montana

Anaconda
MANGANESE
NODULES

AVERAGE ANALYSIS

Mn	60%
SiO_2	8%
Al_2O_3	0.76%
Fe	3.1%
P	0.06%

46381

ANACONDA
from mine to consumer

ANACONDA COPPER MINING COMPANY
Offices: 25 Broadway, New York 4, N. Y.
Anaconda, Montana

Production of farm tools and equipment increased. The largest spinning mill in Korea reopened and was working at 25 pct capacity. Some industries suspended operations temporarily for lack of raw materials and tools but new plants were opened and industrial expansion generally progressed. Supplies of both domestic and Japanese coal increased.

"Methods, including financial aid, by which the United States can assist Korea in developing a strong and independent economy are being considered," the report states. "It was announced as the policy of the United States that such aid as may be given Korea's economic development will be on terms and under conditions agreed to by the Korean Provisional Government."

Precision Casting Group Formed by AFA

New York

• • • **Publication of a technical** book on recommended practices on precision castings by the American Foundrymen's Assn. was discussed at the first meeting of the precision casting committee in Cleveland during the recent AFA convention.

The committee, under the chairmanship of Robert Neiman, director of research for Whip-Mix Corp., Louisville, has agreed upon the expression "precision investion casting process" as the proper means of referring to the lost-wax method of casting.

The committee found agreement at the meeting on the general outline of the proposed publication and established subcommittees to handle the various division sections of the book.

Among the committee members attending the meeting were: L. S. Bergen, Bergen Precision Castings, Inc., Pleasantville, N. Y.; L. W. Gott, Edmos Products Corp., Brooklyn; A. W. Merrick, Austenal Laboratories, New York; W. A. Morey, Universal Castings Corp., Chicago; W. H. Wadhems, Jr., Alexander Saunders & Co., New York; R. T. Gerard, General Electric Co., Schenectady; W. T. Mathes, J. R. Wood Products Corp., Brooklyn; W. E. Mahin, Armour Research Foundation, Chicago; H. Rosenthal, Frankford Arsenal, Philadelphia; and R. C. Wynne, Naval Research Laboratory, Washington, D. C.

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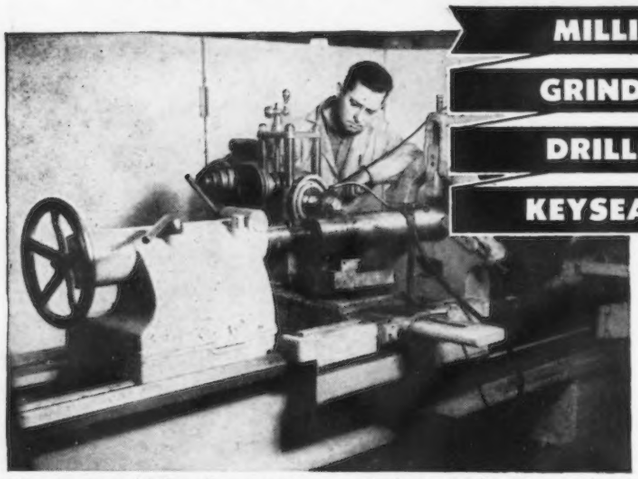

The Master Lathe Converter mounted on tool post carriage of a 27" lathe milling a keyway on a 4½" diameter shaft at the rate of 1½" per minute, using the power feed of the lathe.

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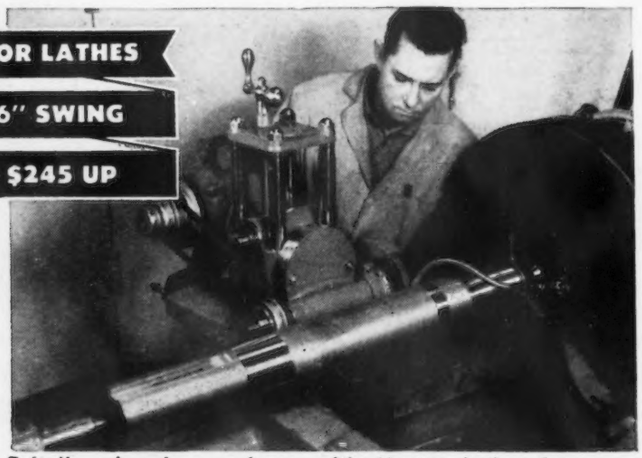

Grinding bearing surfaces with Master Lathe Converter and the Universal Grinding Head. Both Grinding and Milling, as well as turning operations, are done with one set-up of work piece in the lathe.

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Write for Our New Operations Bulletin

Total Canadian Steel Demand Now Running Far Ahead of Output

Toronto

• • • **Despite the fact** that Canadian steel capacity is sufficient to take care of most of the domestic demands in normal times, output at this time is not sufficient to meet 50 pct of requirements under existing conditions. Currently steelmaking operations are being hampered by the acute shortage of pig iron, scrap and coal and on top of these shortages it appears likely that strikes may break out at the various basic steel plants across Canada within the next couple of weeks.

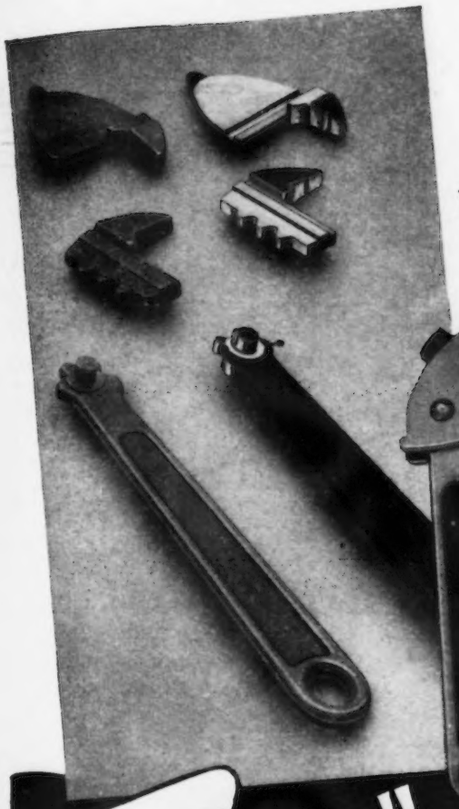
While there has been no definite announcement in this direction, union members have voted in favor of a strike if their demands are not met. The difficulties under which United States steelmakers have had to operate since the early part of this year have made it impossible for Canada to obtain its usual quota of steel from that country and recent imports have dropped to a mere trickle.

The critical steel shortage is having serious effect on all branches of Canadian industry and has set postwar civilian production back more than 2 yr. On many products shortages are more acute today than they were in the stress of the war years and there are no indications of early improvement.

Building trades have been hard hit and many construction jobs are being held up owing to shortages of essential materials. Manufacturing is proceeding at about 25 pct of rated capacity and all industrial concerns find orders piling up with little possibility of them being filled for months into the future.

Under prevailing conditions in the steel industry there is little possibility that prevailing conditions will change for the better for some months to come but on the other hand the chances seem to favor worsening conditions.

Steel sheets and bars are the most sought after line and also the shortest in supply. Insofar as sheets are concerned producers have withdrawn from the market and there is general uncertainty regarding delivery of present orders. Realizing this condition



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THE "GUSHER"
A MODERN PUMP FOR MODERN MACHINE TOOLS

consumers are not coming forward as freely as formerly with the result that there is a big backwash of orders that will be thrown into the market as soon as there is some assurance that delivery will be available in the not too long future.

While some mills are out of the market insofar as carbon bars are concerned, others are accepting future delivery bookings but they decline to make any promise with regard to shipment and are just piling up backlogs in the hope that they will be able to fill the tonnage some time before the end of the year. There have been indications of severe tightening in steel plate supply but so far no serious shortage has developed.

A critical situation has developed in nails and screws and it is likely that this will be more aggravated over the next two or three months. With other departments demanding more semifinished steel, producers have not the wire rods required to increase or even maintain present nail making operations.

Shortage of nails has resulted in general slowing down in most construction undertakings and it is stated that where consumers formerly purchased or were able to obtain nails in keg lots, they are now forced to take delivery a few pounds at a time. Even the retail stores have been cleaned out and it is virtually impossible to obtain fresh supplies at this time. Screws also are in short supply and makers report their books plugged with orders and in some instances backlogs are more than sufficient to absorb all production to the end of this year.

Pig iron supply continues to decline and shortages are hampering both steel production and foundry operations. Shortages of coal are responsible for at least three stacks which could be in operation being out of blast. It is reported that the coal shortage has lopped off more than 25 pct of ordinary pig iron production in this country.

Recent advances in pig iron and steel prices so far have failed to stimulate production, but this is due to adverse operating conditions, chiefly owing to labor troubles, than it is to any reluctance on the part of Canadian steelmakers to step up operations.

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It is reported that . . . . . .

General Electric engineers have devised a method of measuring the temperature inside a gas turbine by making some of the parts of a special chrome cobalt alloy which changes color with increasing heat.

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Patent 2,393,594 covers the use of ammonium nitrate in liquid anhydrous ammonia as a fuel for internal combustion engines. Since this fuel contains its own oxygen, an engine using it could operate at high altitudes without dependence on the atmosphere.

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A novel automobile, designed by Preston Tucher of Ypsilanti, Michigan, now in the road-test stage of development, is reported to have many unique features, such as front fenders that turn with the wheels, three headlights that are dimmed by a photo-electric cell, sealed radiator and center steering wheel. The two-, four- or six-cylinder opposed engine has an aluminum block and fuel injection, but no flywheel and is placed between the two rear wheels. A liquid "torque converter" replaces clutch, transmission, drive shaft and differential.

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Businessmen will soon be offered a triangular desk made of novel woods by Fletcher Aircraft Corp. of Pasadena.

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New York Central has a hot box alarm on its new passenger cars that signals by both smoke and smell.

Pennsylvania Railroad has a new machine that prints tickets as they are sold and also takes care of the ticket seller's bookkeeping.

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Sacro Mfg. Corp. of Bethlehem, Pennsylvania, has an under-the-sidewalk electrical snow-melting system, designed by A. M. Byers Co., that is set in operation by the weight of snow.

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General Electric expects to deliver the country's most powerful electric locomotive in 1946: weight 500 tons, length 143 feet, 8000 horsepower.

The Bell System will test mobile radio-telephone service for automobiles on three highways: New York-Albany-Buffalo, Chicago-Springfield and New York-Boston.

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The modern trend in retail store architecture has resulted in the triple expansion of the Pittsburgh Plate Glass Company's Pittco plant, that makes metal trim for all glass store fronts.

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One of the new ideas in jet engines, developed by Carney Associates Ltd., New York, has two cylinders firing alternately and intermittently in such a way as to make rotating parts for air supply unnecessary.

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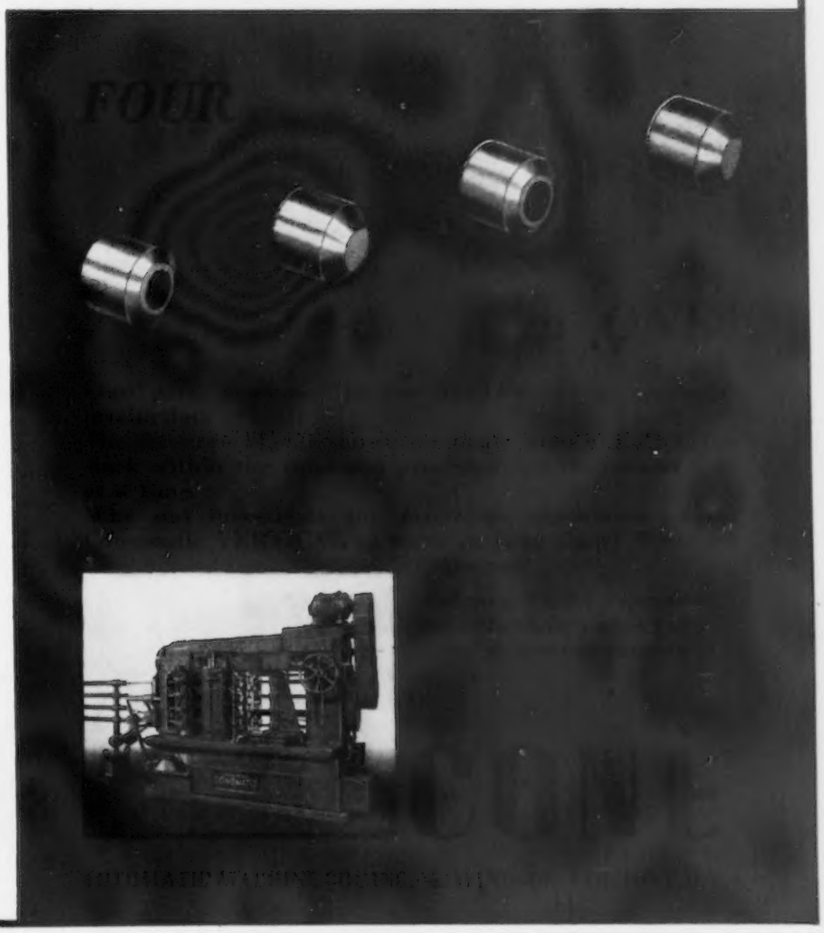
Pontiac, Michigan, is experimenting with a small house, one-third of which is rolled aluminum. It is not prefabricated, but built on the site.



OUT OUR WAY

HOW CAN YOU STAND WORKIN' BESIDE THAT DOPEY KID ON THE OL' TRACK WHEEL LATHE? SOME NIGHT HE'LL BE YANKED UP THROUGH THE ROOF, GETTIN' CARELESS WITH THAT BELT POLE--WHY DON'T YOU TALK TO HIM?
AW, LET 'IM ALONE! HE'LL LEARN--HE WAS CLEANING FLOORS, BUT SINCE THEY GOT SOL-SPEEDI-DRI, THEY COULDN'T KEEP 'IM BUSY, SO THEY PUT HIM ON THE MACHINE --HE'LL MAKE A GOOD MAN!
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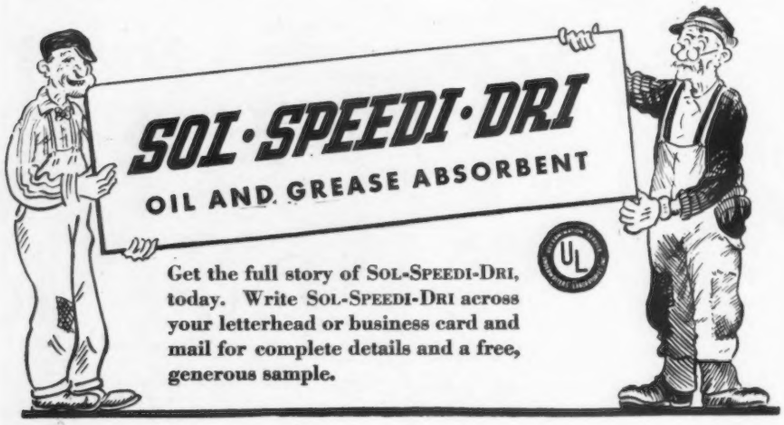
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Sweden Develops Specialized Steels For Foreign Markets

[CONTINUED FROM PAGE 125]

changeable edges which, if successful, would deprive him from all financial troubles for the rest of his life.

The two men happened to pass a dealer in Swedish steel. Mr. Gillette obtained a sample and the experiment proved successful. This incident was responsible for the fact that the razor blade received its well known size, and definite steel analysis, and that the steel, from the very beginning, was obtained from Sweden. True, razor blade steel has become an item of such importance as to attract steel manufacturers in the United States and elsewhere. Yet a substantial proportion of the steel used in this product has up to today been supplied by Swedish mills.

Despite a tight and comprehensive scheme of price control, Sweden has not escaped the worldwide rise in prices and production costs. However, as far as the iron and steel industry is concerned, the highly increased production costs cannot be attributed solely to monetary factors. True, there has been a rise in the wages of steelworkers of 38 pct up to a level of 43c per hr in 1943 and similar wage increases and subsequent price rises have occurred in other industries. However, to a large extent, the increase in production costs is due to a factor beyond the control of the country, namely the deterioration of fuel supply.

The price paid for imported coal rose between 1939 and 1945 from about $7.50 to about $15.00 per ton. However, much more burdensome proved the enforced substitution of wood fuel for coal. In terms of calories, the cost of wood corresponds to a coal price of $30.00 or four times prewar.

Last year, the fuel supply of the iron and steel industry was made up of 85 pct firewood and 15 pct coal. Hence the costs of fuel are almost entirely determined by the huge costs of firewood. This makes it understandable that the fuel costs last year were 3.7 times prewar.

Considering the great importance of fuel in total production

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...those built in the new SHELDON machine tool plant? Always good lathes, these new SHELDONS are even better, not only in design refinements but in extreme accuracy, greater work capacity for size, "sweeter" handling and actual beauty of finish. Only a set-up like the new SHELDON plant could build such lathes—a specially designed building, the most modern manufacturing methods, complete tooling with row on row of the finest, most modern manufacturing equipment.

Make it a point to stop in at your SHELDON dealer's and see these new machine tools. Note their moderate prices. They are a revelation of what modern equipment and methods produce.

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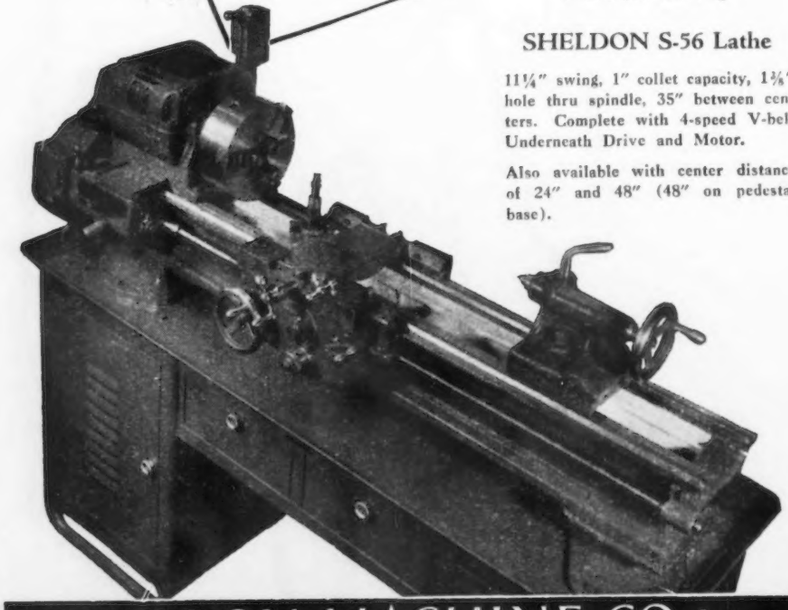
11¼" swing, 1" collet capacity, 1⅜" hole thru spindle, 35" between centers. Complete with 4-speed V-belt Underneath Drive and Motor.

Also available with center distance of 24" and 48" (48" on pedestal base).



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costs it is not surprising that Swedish steel prices have been greatly inflated. As indicated in the table below, price increases between 1939 and 1945 are ranging between 60 and 100 pct above prewar levels.

Percentage Increases of Swedish Steel Above 1939

Charcoal pig iron	100 pct
Acid openhearth ingots	92 pct
Electrical steel ingots	63 pct
Tubes (low carbon content)	89 pct
Pen steel	64 pct
Razor blade steel	65 pct

Although American steel mills have experienced a rise in wages of about the same degree as the Swedish companies, they have, in regard to fuel, been operating under much more favorable conditions. Consequently, Swedish steel prices have come to compare very unfavorably with American quotations. Last year the cruder grades of steel in Sweden were priced about 50 pct above American ceilings. With respect to more processed steels the price discrepancy was, of course, smaller or about 30 pct.

With the end of the war the fuel situation has grown still worse, and in 1945 only 450,000 tons of coal and coke were imported, (half of it from the United States) or less than any time since the 1860s. Of course, during the period ahead, coal supplies will again increase, which, in turn, without any deflationary pressure, will be accompanied by declining steel prices. Therefore, it can be expected that the competitive position of Swedish steel as compared with American steel will largely, though perhaps not entirely, be restored at the very moment when, with the end of the transition period, prices again become a decisive factor on world markets.

Considering the absence of domestic coal deposits and the high price of charcoal, it is not surprising that the Swedish steel mills have always made great efforts to economize fuel. Domnarvet, Sweden's largest iron plant, has, in fact, the lowest coke fuel consumption in the world. In order to save fuel 70 pct of the raw material of the blast furnaces is now supplied in the form of sintered ore, which means a reduction of charcoal consumption by, on an average, 20 pct.

It may also be recalled that Sweden has played a leading part in the utilization of electrical power in the iron and steel indus-

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RED "NOT GO"
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Balanced drive gears with automatic oil bath lubrication—permanent alignment—anti-friction bearings—give Shepard Niles cranes precision control operation and more dependability under constant load handling. Shepard Niles cranes are designed and built for tough, long service with a thorough knowledge of the performance expected of them.

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For smooth, constant, dependable lifting and handling, select a Shepard Niles hoist. The completeness of the Shepard Niles line of electric hoists permits the selection of the most efficient lifting and load-moving equipment for any requirement.

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CRANE & HOIST CORPORATION
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try. The electric blast furnace is, in fact, a Swedish invention. The consumption of charcoal in such a furnace is about 24 hectoliters per ton of pig as against 53 hectoliters in a charcoal furnace. The coke consumption in the production of coke pig iron is, on an average, 80 kg per ton of pig iron.

However, the electrical pig iron process is an expensive one, and for this reason, production of electrical pig has been limited to 6 to 8 pct of the total. Yet, with the new Norrbottens Jarnverk, which will be described later, the electrical pig iron industry has entered a new stage of development.

The shortage of iron and steel resulting from the interruption of normal trade channels provided, quite naturally, a great incentive for the extension of domestic production facilities. Although the lack of fuel during certain periods seriously hampered production, available statistics disclose an advance of iron and steel production by about 10 to 15 pct. In 1945 pig iron production was 756,000 tons and the output of rolled iron 880,000 tons.

However, the greater part of the expansion is still ahead. Domnarvet is about to enlarge its steel capacity to 400,000 tons as against 225,000 tons prewar, and further expansions are under way at Fagersta, Uddeholm and Hofors. Thus during the next few years, Sweden's production capacity for rolled steel will be increased by about 300,000 tons a year.

One of the most interesting and significant developments in Sweden's iron and steel industry is undoubtedly the erection of a large steel plant in the North of Sweden, a project that has been discussed and investigated for 25 yr.

Norrbotten Jarnverk Co. is in many ways a remarkable venture. Contrary to all the other steel mills, which are situated in Central Sweden and use the pure iron ores of that district, this new plant is based on the phosphorus Lapland ore which so far has been exported to Germany, Great Britain, the United States and other countries. It is an electrical pig iron plant, and the largest of that type in the country.

In some respects its economic foundations appear sound. Located near Lulea, the Baltic ore shipping

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port, it is in the vicinity of the world's richest iron deposit with an iron content above 60 pct. Power is cheaper here than in Central Sweden and so is charcoal. Coal can be obtained at low rates as backfreight on ore cargos.

On the other hand, the production process is costly and the plant is far away from the consumers, who are all situated in Central Sweden. Private enterprise has always considered this project as too risky. Consequently, Norrbotten Jarnverk has become a state-owned organization, though managed along the same rules as a private company.

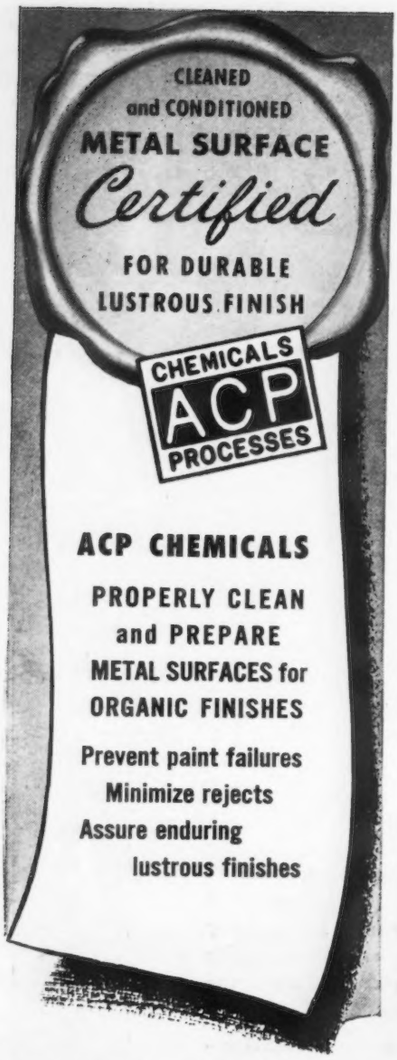
Late in 1943 the plant began its operations with an initial capacity of 60,000 tons per year. During the following 2 yr pig iron capacity was enlarged, an electrical steel furnace and a Thomas plant were added. Present capacity can be put at close to 100,000 tons.

The most remarkable innovation is the prereducing plant, the first of that type in the world. This plant takes care of the gases derived from the electrical pig iron production by using them for the reduction of iron ore. Thanks to this arrangement the requirements of fuel and power will be substantially diminished.

What has been accomplished so far is, however, only a beginning. According to proposals recently put forward, this plant is to be expanded in two stages. In the first one, a coke furnace will be erected with an annual capacity of 200,000 tons. Furthermore, two rolling mills are to be built, one of which is designed for structural steel and will have a production capacity of 200,000 tons.

Thus the first goal is to arrive at a production capacity in pig iron and rolled steel of 300,000 tons. In the second stage an expansion of the production facilities for pig iron to 500,000 tons per year is conceived.

It is interesting to note that, by proposing a coke pig iron furnace, the company is not desirous of continuing on the line of electrical pig. Another notable feature is the large size of the pig furnace and one of the rolling mills, both of



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Chicago Detroit Pittsburgh San Francisco Tacoma

200,000 tons. Considering the need for a great variety of grades and qualities this project, critics point out, appears as a very unsound and uneconomical experiment. It is also far from certain that it will be completed in the form and to the extent proposed.

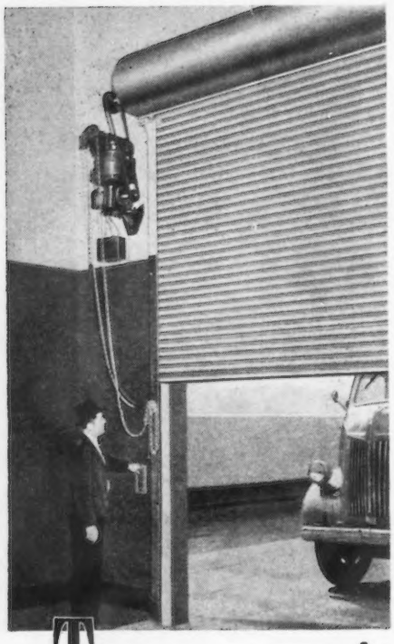
There is, of course, also the problem of marketing such an enormously increased output of pig iron and steel. Although some of the production might be exported, the bulk will have to be sold on the domestic market. In the past there has been an average increase in iron consumption by 5½ pct and in production by 6½ pct, per year. The promotors of the Norrbotten project seem, however, to reckon with an even more rapid rate in the years to come. According to their calculations, notwithstanding the expansion proceeding in private industry, there will be by 1950 an increased consumption of 500,000 tons of iron and steel beyond the present level, which would have to be covered either by increased domestic production or increased imports.

During the present year Sweden's import requirements can be put at 400,000 tons, or about the same volume as prewar. The most important supplier is likely to become Belgium, including Luxemburg, which country also has been the first one to ship iron to Sweden after the end of the war. Additional supplies, including substantial quantities of plates for the shipbuilding industry, are expected from Great Britain and from the United States.

Great Britain has been very slow in effecting deliveries to Sweden. In addition, British prices are comparatively high, hence Swedish importers have not been anxious to buy in that country. However, the Swedish Government considers it desirable to draw upon this source to use up the huge sterling assets which Sweden has accumulated as a result of surplus shipments.

Before the steel strike in the United States, shipments from this country to Sweden were insignificant, but it is hoped that during the second half of this year, substantial deliveries will be effected. The United States is also the primary source for supplies of pig iron. The orders placed in this country can be put at 100,000 tons.

One of the most significant ef-



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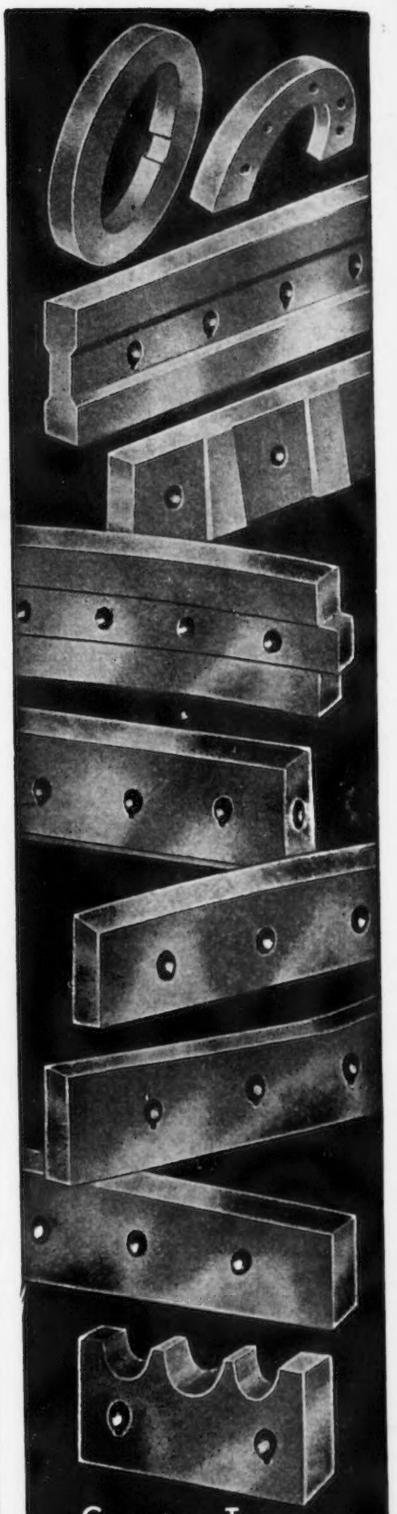

Greater Tonnage Per Edge of Blade

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fects of the war on the Swedish iron industry has been the transition from high quality to ordinary grades of steel, the result of the lack of markets for the former, and the serious shortage in the last named grades. Whereas normally 60 pct of the Swedish steel ingot production was composed of high grade steel, this share was subsequently reduced to 30 to 35 pct.

Strangely enough, 75 pct of Sweden's steel exports last year, amounting to 110,000 tons, was made up by ordinary grades of iron. These exports were largely of a relief character, and there is no doubt that shipments of that type will soon disappear. The foreign demand for these grades is, in fact, rapidly ceasing as supplies from other countries become available.

The Swedish steel mills have long been waiting for the time when they again can use their facilities for the production of high-priced quality goods. This process is now, though slowly, underway. Recent reports indicate that the share of high grade steel in current production is above 40 pct.

In this process the restoration of export markets is of vital importance. It will be no easy task. Normally 13 pct of Sweden's steels were destined for Germany and 7 pct for Japan, which countries now are out of the picture. Moreover, some of the customers are unable to absorb as much as prewar.

This applies particularly to Great Britain where previously 23 pct of Sweden's steel exports were marketed. In the trade agreement with that country last year, Swedish steel shipments amounting to $4.5 million, were conceived. However, the British authorities have been slow in granting import licenses for this product.

In the United States the outlook is more encouraging. In 1937 this country imported from Sweden $6 million worth of steel, which is more than imports from any other source. On the Swedish export list the United States ranked second only to Great Britain.

The primary difficulty on this market is that of prices, as Swedish steels in that respect compare unfavorably with the domestic products. However, most of the former customers have expressed their desire to go back to Swedish steel and, during the recent months, ship-

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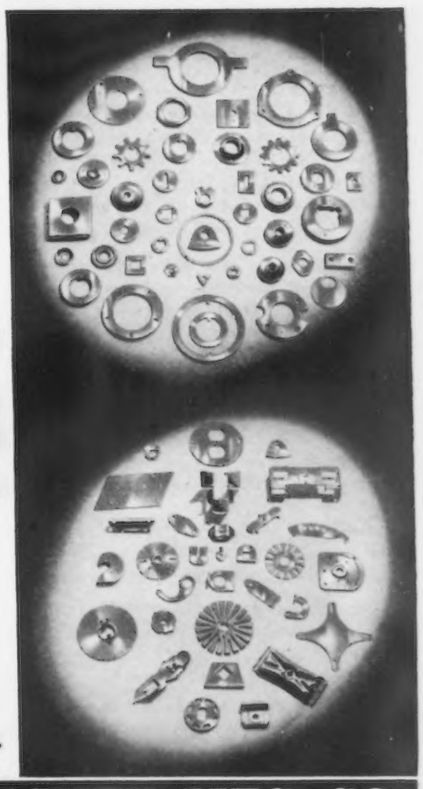

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LOCATION—Southeastern corner of the United States, strategically located to serve economically the increasingly important industrial Southeast, interior markets, Gulf and Pacific coasts, South America and world ports.

LABOR—Ample supply of skilled and unskilled labor, largely native born, cooperative and easily taught. Many workers skilled in metal work due to shipbuilding, metal fabrication and other heavy war work.

DISTRIBUTION FACILITIES—A major Atlantic port and highway center, served by four trunkline railroads, and intracoastal Barge Canal providing a sheltered waterway from New Jersey to Miami. Three major airlines, and numerous bus and truck lines.

CLIMATE—Ideal year-round climate permits great savings in plant construction, heating and maintenance, and guarantees more working days per year. Living is less costly and more pleasant because of equable year-round weather.

MARKET—Jacksonville's non-competitive distribution area embraces a population of 3,420,770 with an effective buying income of $2,626,291,000. The local wholesale trade area includes a population of 1,194,891 with an effective buying income of $1,045,792,000.

A specific industrial and market survey will be prepared at your request. Write us and outline your needs. Correspondence will be strictly confidential.

Dept. A., Industrial Division, Chamber of Commerce.

Jacksonville FLORIDA

ments to this country have greatly improved.

In order to make good for the losses of some former markets, Swedish steel mills have been endeavoring to promote sales on new and undeveloped markets. For this purpose a joint sales organization was formed last year, comprising the four most outstanding high grade steel mills in Sweden; Sandviken, Fagersta, Uddeholm and Hallefors. The idea seems to be to penetrate such countries as China and other Asiatic areas, Australia, and possibly South America.

In many countries there is a common belief that steel products from Sweden can be obtained at shorter terms than from the United States and Great Britain. Whether this is true or not, there has undoubtedly been an inflow of orders from many new customers in South America and elsewhere. Recent reports indicate that present orders would require shipments of high grade steels 30 pct above the record level of 1937, when 225,000 tons were exported. However, under present conditions, the Swedish steel mills will not be able to come up to that volume of export shipments.

Completes Clearing Of War Plants' Inventory

Washington

• • • **Virtual completion** by the War Dept. of clearing war production plants of termination inventory has been announced by Under Secretary of War Kenneth C. Royall. Since the end of the war, property having an original cost of $2.124 billion has been purchased by the contractors in whose plants the property was located. An additional $893 million has been shipped to the warehouses of the various disposal agencies. Another $646 million has been disposed of or utilized by the Army.

Nearly 100,000 of the inventory listing have been jointly cleared by the Army and its contractors. Almost 60 pct of this property, including 22,000 machine tools, was purchased by the contractors.

Under Secretary Royall said that strikes have, in some cases, hampered contractors in making their listings and delayed the Army in its job of clearing the plants.

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THE GREATEST IMPROVEMENT IN WORK GLOVES IN THE PAST TWENTY YEARS!

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Where several different electrodes are being used for mild steel applications, it will pay you to investigate the all-around usefulness of Murex Type U. Here is a versatile, general-purpose rod designed to meet a wide variety of welding needs—thus eliminating the necessity of purchasing a large number of diversified electrodes.

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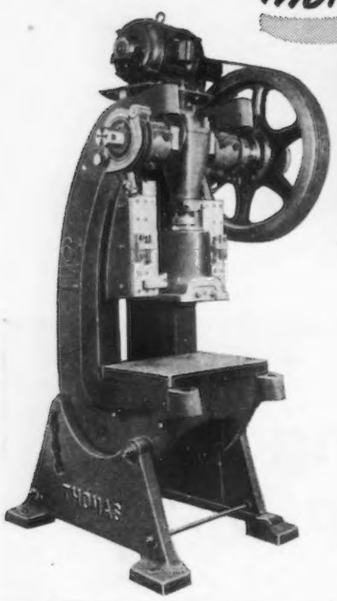

These recently introduced Thomas Inclinable Presses are now available for reasonable deliveries in 50, 75 and 100 ton sizes. They fittingly supplement the nationally famous line of Thomas equipment for Industry's varied metal-fabricating requirements. Write for information.

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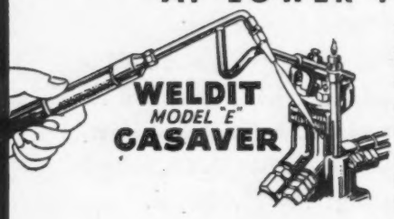

The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

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Weekly Gallup Polls

[CONTINUED FROM PAGE 117]

asked people whether they thought Spain should be allowed to become a member of the United Nations.

Seventy-six per cent opposed, 12 pct favored the idea. Twelve per cent had no opinion.

Only six out of every one hundred in the poll had anything favorable to say about Franco, when asked to state their opinion of the Spanish dictator.

•

• • • **If a presidential** election were held today, Democratic Party prospects would not be so good as they were in 1944 or 1945.

A survey of political sentiment by the institute finds that 52.5 pct of the voters of the country say they would vote Democratic in a presidential election at this time.

That figure compares with 55 pct in February of this year, with 58 pct last August—the month the war ended—and with 53.8 pct of the major party vote won by the Democrats in November 1944.

The present decline in Democratic Party strength is revealed in replies to the following question, put to a cross-section of the voters of the nation:

"If a presidential election were being held today, which party would you vote for—the Democratic or Republican?"

Along with today's replies, here is a picture of Democratic-Republican Party strength since November 1944, as found by the institute in periodical polls:

	Democratic strength Pct	Republican strength Pct
1944 election	53.8	46.2
May 1945	54	46
August 1945	58	42
February 1946	55	45
TODAY	52.5	47.5

About one voter in every four was undecided.

The results in this poll deal, of course, only with general party strength in relation to the next presidential race in 1948. They obviously cannot be used as a measure of how individual Congressmen will run in the November Congressional elections.

Navy Exhibits New Developments In Ordnance Equipment and Armor Plate

Naval Proving Ground, Dahlgren, Va.

• • • **New developments in** ordnance equipment, including guns, rockets, bombs, and the latest in armor plate, were revealed by the Navy in a demonstration here on May 22.

Top-quality American and German armor plate was exhibited. Some of the plate was shown in its original state before firing by the proving ground plate battery. Other plate had been badly marked by 6 in. and 14 in. projectiles.

Four penetrations were registered on 5 in. Class A plate No. 13316 with 6 in. shells. This plate was accepted by the Navy since it would withstand other projectiles and fully met specifications.

Two 14 in. shells penetrated 14 in. German Class A Plate No. 33353, but Naval Ordnance officers said the plate was "equal in quality with the best U. S. armor." Two hits had been registered on this plate by the Germans before it found its way to Dahlgren.

The 12 in. Class B German Plate No. 42940 had been blasted with 14 in. shells and was termed "below average quality U. S. armor."

Also tested were the following types of plate: 4 in. Class A Bethlehem plate with 2 x 2 in. decapping bars 4 in. from face of plate; and 5 in. Class A Bethlehem plate. Waiting to be tested were 3 in. Class B Carnegie Plate No. TT-890 and 13.5 in. Class A Carnegie "Proj. Test" Plate No. RR-344.

A new 60 caliber aircraft machine gun was shown for the first time. This gun, still under development, fires about 700 rounds per min and has a muzzle velocity of approximately 3500 ft per sec. The slug is about 50 pct heavier than that fired by the standard 50 caliber machine gun.

An improved 50 caliber machine gun, the M-3, designed jointly by the Army and Navy, was also shown. This improved model is capable of firing 1200 rounds per min as compared with a rate of 850 rounds per min for the standard M-2 model, used during the war.

The 3-in. 50 caliber anti-aircraft gun, with a fully automatic loader, represents an important stride in protection against aircraft. While the gun itself is not new, the automatic loading mechanism, developed by the United Shoe Machinery Corp., greatly increases its effectiveness.

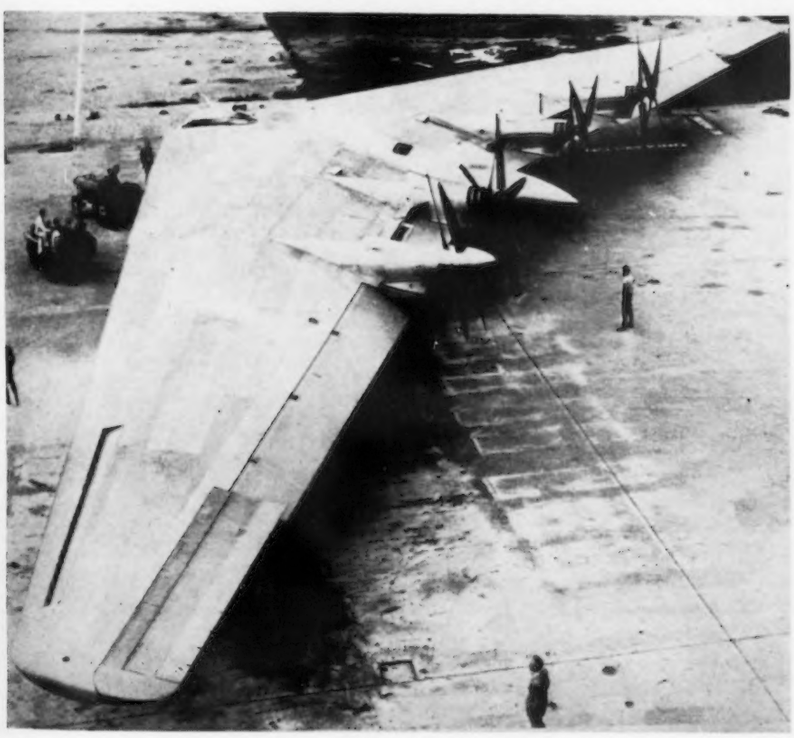
This gun along with the 3-in. 70 caliber anti-aircraft weapon, which is still in the early development stages, was designed to be an effective answer to Jap Kamikaze attacks. With the automatic loader it can fire 50 to 53 rounds per min at an effective range of 14,000 yd. Its muzzle velocity is approximately 2700 ft per sec.

The 3-in. 70 caliber is the latest high velocity gun now under development and will fit into a completely automatic machine gun mount. Several barrels have been made for the gun, but there has been no complete assembly. Its accuracy, rate of fire, effective range and damage effect is expected to be many times greater than that of any anti-aircraft machine gun now known to be in existence. The design of the 210 in. barrel and projectile embody new details not previously in United States Ordnance, to obtain longer life, higher velocity and greater accuracy.

Demonstrated for the first time was the fully automatic rocket launcher, the Mark 102, which is now in service. It is director controlled and power driven, like a gun mount, and can maintain a continuous stream of accurately aimed 5-in. rockets at a rate of 40 to 50 rockets per min.

Two 1000-lb bombs were detonated. The one with a standard type explosive loading only scarred a 6-ft square concrete reinforced block; the one containing the same amount of the same kind of explosive, but loaded by a new method, turned a similar block over and blasted a hole through it. This new method of loading concentrates and directs the force of the explosion so that little energy is wasted.

THE FLYING WEDGE: *The Northrup Flying Wing, XB-35, being wheeled to a runway for its first taxi test in preparation for the initial test flight later this summer. The taxi run was designed to test engine and ground control operation.*



RB&W carriage bolts

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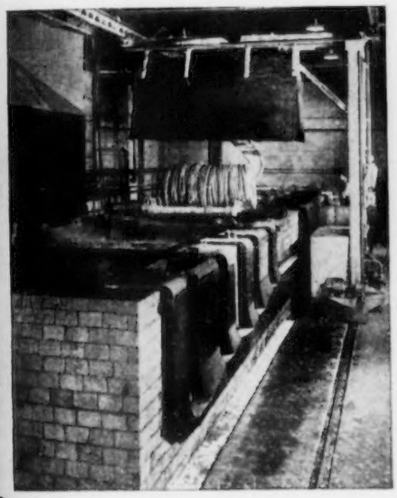
This photograph suggests the broad range of fasteners manufactured by RB&W. From stove bolts to Hi-Carbon Heat-Treated Cap Screws, the energies of development, manufacturing and quality-control departments are directed toward creating an *engineered* fastener — one that can be depended upon by the user for fast assembly, assured holding power, and appearance that will be a credit to the product on which it is used.

BOLTS BY BILLIONS — RB&W maintains stocks of raw material that are large enough to provide flexibility for a wide range of fastener production. This raw material is subject to careful analysis in RB&W's completely-equipped laboratory.



CLEANING AND COATING — RB&W draws its own wire to assure close tolerances vital to perfect cold-heading. Pickling — in this scientifically controlled cleaning department — leaves the wire free from mill scale, and provides opportunity to coat it properly for subsequent drawing and heading.

NUT FITTING AND PACKING—Fitting nut to bolt is a final inspection of the product, and provides protection for the threads during shipping and handling. From these automatic machines, assembled bolts and nuts are put into durable cartons and packages labeled for maximum visibility.

FAST SERVICE — In RB&W's three plants (Port Chester, N. Y., Coraopolis, Pa., and Rock Falls, Ill.) immense stocks normally are carried in a broad variety of types, sizes and finishes. Modern handling equipment contributes to rapid shipment, full quantities, and accurate markings.

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Colombia Buys 5000-KW Packaged Power Plant For Its Major Seaport

New York

• • • **An important peacetime** application of the war-born unit electric power plant was announced this week by William E. Knox, vice-president, Westinghouse Electric International Co., who disclosed that a 5000-kw plant is being installed in Colombia and soon will be providing electrical power at Barranquilla, the country's major seaport.

"A big brother of the packaged power plant, this unit contains all the necessary parts of a power station, including the steam generating unit, turbine generator, pumps, piping, wiring, and other essentials," Mr. Knox declared. "The plant was engineered for Westinghouse by the firm of EBASCO Services, Inc., which has had international experience in power plant design problems. The power generating unit used in the unit power plant is of new design and is the first application of such principles employed in land turbines for this capacity."

The plant is being permanently erected at Barranquilla by the Cia Colombia de Electricidad and along with a duplicate unit now being manufactured, will furnish current for textile and flour mills, breweries, oil refineries and soap factories.

Packaged power plants originally were designed to meet war conditions in China and were later used throughout the world to meet the great need for electric power. These were followed by mobile power trains of both 1000 and 5000-kw capacities easily and rapidly moved by rail, and then by semi-portable power plants to be hauled on trailers and erected in a matter of days.

Early packaged power plants which were sent to Russia, Italy and the Netherlands to speed those countries' rehabilitation programs generated only 1000 to 2000 kw of power, Mr. Knox explained. The 5000 unit power plant going to Colombia is of a size sufficient to provide electric power for a residential city of 25,000.

About 50 pct of the apparatus for the completed unit is manufactured by Westinghouse, the remainder by 20 subcontractors, it was pointed out. The complete plant is shipped in prefabricated parts as large as can be handled by the transportation facilities on which it must travel.

Various models of unit power plants have been delivered for war and rehabilitation uses to China, French North Africa and South America, in addition to the countries already mentioned.

Will Use 3S License Tags

Pittsburgh

• • • **Culminating** a program which has been underway for several years to effect the necessary legislative changes to enable the State of Maryland to use permanent aluminum automobile license tags, Gov. H. R. O'Conor announced that such tags will be provided for motor vehicles in 1947.

The new plates, 6¼x16 in., will be produced from 3S mill finished flat sheet, 0.051 in. thick. The new permanent license plates will have date clips to be attached to the tags each year and duplicate plates, for front and rear of vehicles, will be readopted. It was estimated by the governor that the system would enable the state to save $60,000 a year after the first year.

Conference Reviews Europe's Coal Supply

London

• • • **The European Coal** Organization is holding a conference in Paris, under the chairmanship of Eaton Griffith, commencing May 21 to review the probable coal position in Europe over the next 12 months. About 20 nations will be represented, in addition to the Allied Control Commission for Germany and certain other international organizations such as UNRRA, the European Central Inland Transport Organization and the Emergency Ecoomic Committee for Europe.

The main task of the European Coal Organization at the present time is to insure a fair and equitable distribution of all coal supplies available to Europe. These supplies recently have included a contribution of over 1½ millions tons a month from the United States and about one million tons from Germany. The purpose of the Paris conference is to take a longer view and to draw up a forecast of the probable relation of supply and demand over the next 12 months so as to furnish a guide to countries in planning their general economies during that period.

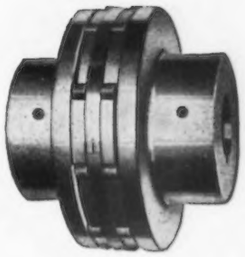
SCATTERED SURPLUS: *A sea of U. S. Army vehicles, including tanks, armored cars, tractors and half-tracks, greets the eye at the Tusfet Boblingen Ordnance Depot, Wurttemberg, Germany. Equipment from U. S. installations has been scattered, some having been returned to the U. S. and some scrapped or abondoned.*

The London Economist

[CONTINUED FROM PAGE 121]

It also involves the maintenance of armies of occupation. These disadvantages are aggravated by the clash of Allied policy in Europe. Many British and American statesmen now argue that to continue vainly to seek agreement with Russia, particularly over the future of Germany and Austria, leaves the Western Allies with the worst of both worlds. They complain that the Russians in their own zone tend only to pay lip service to joint agreements, say, on economic unity or unified transport. But they can and do veto any proposals which the British and Americans wish to apply in their own zones. If, on the other hand, the effort to reach agreement were abandoned, the British and Americans would probably gain much greater freedom of action in their own areas, while their influence in the Russian zone could hardly be much less than it is.

There is another argument in favor of independent Western action which springs from the directly opposite desire—the desire to secure an agreed policy even at the eleventh hour. It is based on the belief that a strong American threat to end the effort at negotiation and, if necessary, to make a separate peace would jolt the Russians into a realization of how far they had stretched the patience of their allies by their unyielding diplomacy. They might then return to the conference table on June 15 ready to negotiate on a basis of genuine concession and agreement. Those who put forward this argument point out that on a number of points—the Italian colonies, reparations, the Dodecanese—Mr. Molotov was more conciliatory at Paris than at any previous conference. They also recall San Francisco where, after weeks of intransigence, the Russians conformed in large measure to world opinion. And they pick on certain small but significant changes in Russian policy in Europe as pointers towards a potential slackening of Russia's grip on the Danubian countries. For example, the Russians have tried hitherto to hold the balance between Hungary and Rumania. The transfer of the whole of Transylvania to Rumania at the Peace Conference can be inter-



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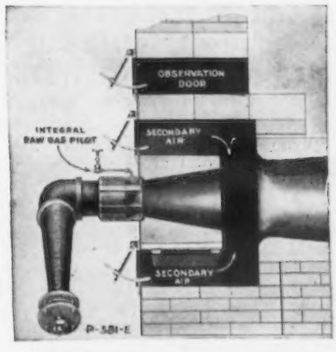

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The "Airocool" gas burner gives efficient results throughout the operating range.

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Ask for our Bulletin #4 with detailed information concerning the "Airocool" and its possibilities.

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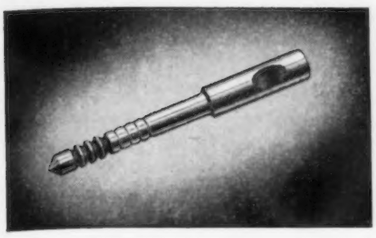
preted as a sign that in the long run the Russians might, if the present internal and external pressure were maintained, withdraw from Hungary completely.

But the arguments against risking an open breach between the Allies are equally cogent. To accept a permanent rift, to base the postwar settlement on two worlds—a Russian and a non-Russian—must make for friction and endless rivalry, and if the unhappy history of the past is any guide, lead ultimately to war. Nor is it at all certain that the threat of a separate peace would drive the Russians to greater efforts at conciliation. They have lived in seclusion before. They know it can be done and their suspicion of their allies may by now be so great that they might welcome the possibility of seeing the last door closed. Separate peace settlements in Italy, separate policies in Germany and Austria, might give the Russians an even freer hand in their own zones and relieve them of the pressure for moderation and conciliation which they must now feel. At the same time, they would still be in a position to use the Communist parties in the West to balk any party or any program which they believed to be anti-Russian.

But perhaps the gravest objection to the policy of abandoning four-power agreement lies not so much in what the Russians have done or might do as in the Allies themselves and in their policies. Can it be said with any certainty what sort of peace settlement and what sort of postwar structure in central and western Europe the Americans would really be prepared to back diplomatically and economically? The answer, dear to Americans, that they seek a return to normal conditions, hardly makes sense, for what is normal after the greatest upheaval of all modern history? Nor is the answer "democracy" or "freedom" a complete answer, for there are a host of economic and social conditions under which democracy cannot live. The conditions of free capitalism, driven helpless and rudderless before the gale of a world slump—in a word, the conditions of 1932—will not produce or maintain democracy, yet at times Anglo-American policy looks perilously as if it would be content with a mere

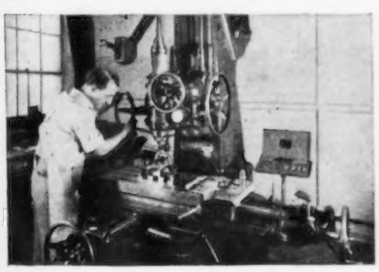
RECIPE FOR PRECISION



Precision tools, used daily to machine to close tolerances, must themselves be built with hairbreadth accuracy. Here is an Ace recipe that worked successfully for one such precision instrument—a size and burnishing tool!

Start with high-speed Delloy steel. Machine it in the rough. Heat-treat according to the specifications for that particular steel (Rockwell C63/66). Grind the shank in a centerless grinder to a tolerance of plus or minus .00025". Place in a cylindrical grinder, grinding the sizing and burnishing diameters of the bit to a tolerance of plus 0", minus .0005". Result: a fine precision tool, a product of Ace skill down to the last ten-thousandth of an inch.

This is just one example taken at random from the hundreds that pass through the daily grind here at Ace. Ace offers a complete service for the production of small parts and assemblies . . . in any quantity, to tolerances of .0001" . . . whether the material is steel, non-ferrous metal, or glass. With Ace, you purchase all your precision work in one place from the tool and die stage, on through stamping, machining, heat-treating and grinding. All of the work is carried out under a single roof, a single, competent management. Send us a blueprint, sketch, or sample for quotation.



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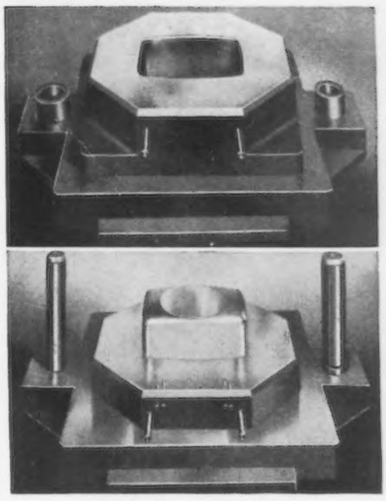
restoration of the Pre-Hitler Status-quo.

It is on this point that a certain amount of Russian criticism—though not its extravagance—is valid. In the American and British zones in Germany, men are in positions of influence who occupied them under the Nazis or who stood back to let the Nazis in. The restoration of German industry under the leadership of such groups would mean putting a weapon back in the hands of men who have already abused it twice in a generation. Again, American loan policy and American dealing with Austrian and German firms has in it an element of the "economic domination" which Mr. Byrnes rightly attacks when it is practised by the Russians in Danubia. In Italy, it is an incontestable fact that Anglo-American support has gone on the whole to men whose democratic record was at least dubious and has often failed to support the new popular forces released by the defeat of Mussolini.

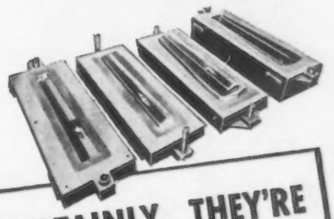
It is in this context that the danger of an open breach with Russia is most obvious. Hitler received the support of large sections of his people—and of Europe—on the basis of anti-Bolshevism. Today, all over Europe, a potential anti-Communist crusade is in the making. Its members would be only too happy to enlist the support of Mr. Byrnes and Mr. Bevin and to use them as a cover for every reactionary force which supported Hitler and was submerged only by his defeat.

One fact, therefore, is certain. A decision of the Western Powers to negotiate a separate settlement would be very dangerous unless the policy behind it were clearly and unequivocally democratic, progressive and deliberately anti-fascist. To be so, it would need to be vigorously and clearly formulated, for the forces of inertia with all drag towards the "anti-Bolshevik crusade." So far, there is little sign of such a formulation and Mr. Byrnes' proposals for separate negotiation must therefore be considered with extreme caution. It may be that the Western Allies will be forced to take this path, but they do so at their peril if they have not first clearly and honestly determined where that path will lead them.



Punch and Blank Holder

Hood Top Forming Dies



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Woodworking Machine Prices Raised by OPA

Washington

• • • **OPA has allowed** manufacturers of woodworking and timberworking machinery an interim price increase of 10 pct over base maximum prices to compensate for increased costs of labor, steel, motors and other items. The increase became effective May 29.

Because of the small discount range to the relatively few resellers, the latter are permitted to increase their ceilings by the same percentage amount by which their net invoiced costs are increased.

Machinery affected by the action includes sawmill, cooperage, veneer and plywood making, wood and timber working machinery and many other machines involved in lumber production from the forest to finished products for end use requirements. However, portable hand and portable power driven tools are specifically excluded from the increase since they are covered under separate orders.

Named to Patent Group

Washington

• • • **Secretary of Commerce** Henry A. Wallace has announced that Morris Llewellyn Cooke has become a member of the Patent Survey Committee. This Committee, under the chairmanship of Will Davis, is now engaged in preparing recommendations requested by President Truman regarding the operation and effectiveness of the patent laws.

It was also announced that Attorney General Tom C. Clark has resigned from personal participation in the work of the Committee. He will serve, however, as consultant and adviser to Mr. Wallace on the problems involved, and has agreed to expand the assistance being given the Committee through the members of his staff in the Dept. of Justice. Other members of the Committee are Dr. Charles F. Kettering and Dr. Vannevar Bush.

Plant Finds Way To Beat Coal Strike With Auto Engine

Detroit

• • • **The huge Dodge** main plant at Detroit found a way recently to beat the coal strike by generating a portion of its own electrical power—without coal. At the Dodge plant, electricity is being generated as a byproduct of automobile engine testing on electronically controlled dynamometer stands.

During the war, this method was used in aircraft engine practice. Dodge is the first automobile producer to adopt the method to car engine testing.

The dynamometer test stands replace the old block test which required an hr and a half and the old dynamometer test which took an additional ten min. Using the present method, the time required for fully testing an engine has been reduced and efficiency of the test has been improved by running the engine under load.

The present practice at Dodge is to deliver finished engines directly to the new dynamometer room. Sixty dynamometer test stands are arranged in two long rows between which passes the conveyor line of moving engines. The room has a present capacity for testing 120 engines an hr. "Green" engines are lifted by overhead cranes directly from the line to the dynamometer stands. During the test, which requires 20 min running time, each engine drives a generator that feeds electric current into the Dodge power lines.

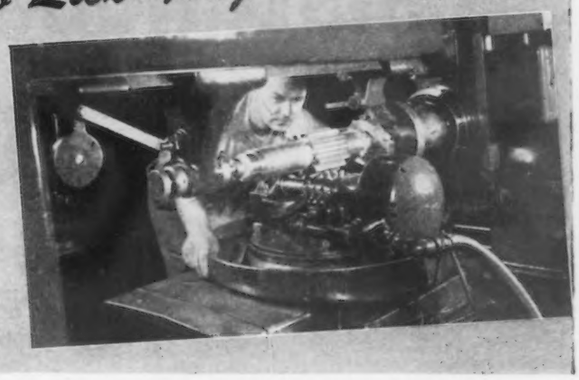
The stands themselves are finished in baked enamel. An upright portion, little bigger than a six ft home refrigerator cabinet, contains a generator and electronic controls that operate an instrument panel. Adjoining this is the base on which the engine is mounted. All lines for fuel, water, oil and exhaust gasses are underground. Connections are easily attached and detached, and a hydraulically operated throttle adjusts automatically as the engine runs from idling speed up to full load.

Electronic controls are so completely automatic that there is virtually no possibility of human error entering into the test procedure.

Ability to Lick Tough

Gear Production Problems!

Fairfield hobbing machine for hobbing spur gears and splined shafts.



• FAIRFIELD'S production of many thousands of differentials for heavy duty trucks typifies an ability to produce all kinds of gears, splined shafts and differentials.

There are two big reasons why FAIRFIELD can make gears to specifications in such quantity. First, all departments are well-equipped with enough machines for almost any production run. Second, FAIRFIELD machinists are skilled craftsmen who know their trade.

Next time you have a gear production problem, see FAIRFIELD first!

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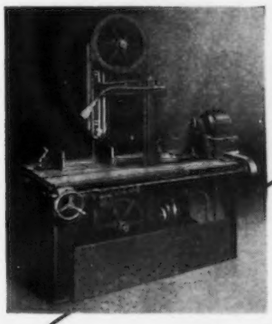
FAIRFIELD For FINE GEARS



No other saw can do as much!

No Other Saw Can Do As Much!

MARVEL Universal Band Saw, 18" x 18" capacity, will cut-off, slot, trim, mitre, notch, rough-out, or split bar stock, pipe, structural sections, mouldings, tubing, large regular shapes, or small irregular and standard shapes with speed, ease, and convenience. Few shops working with metal can afford to be without this most versatile of all saws.

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Mitre cutting is simple and accurate with the MARVEL Series 8 Band Saw. No change in position of work. Simply set the saw column at any required angle up to 45° either right or left of vertical. Do not confuse with any other "band saw". There is no other machine like the No. 8 MARVEL.

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Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

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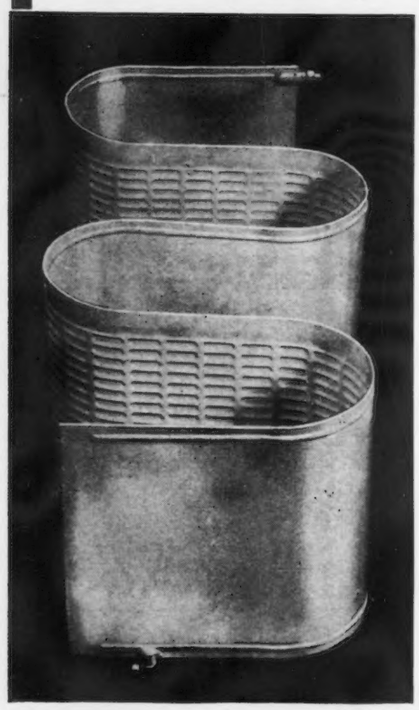

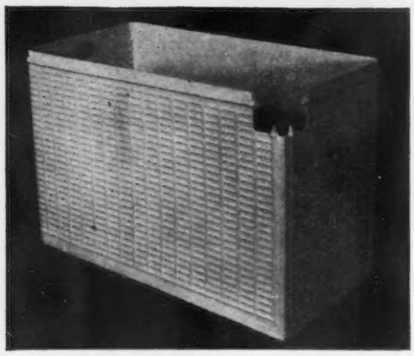

The serpentine shaped plate above makes an efficient refrigerating unit for a four-can ice cream cabinet. Square one below it is for a deep-storage unit. Note the bending these welded fabrications must stand and still be gas-tight.

SEVEN Federal 75 KVA press type spot welders and two Federal 150 KVA seam welders deliver close to a million spot welds and some five miles of seam weld weekly to produce thousands of feet of Hubbell-Yoder Refrigeration Plate, at the Cleveland plant of The Yoder Company Fabricating Division.

These patented plates make deep storage cabinets, refrigerator cars and trucks, ice cream cabinets and frozen food lockers easier to produce, cheaper and more efficient. They are typical of the many useful products which can be manufactured on a practical production basis only because of the indestructible type of fast automatic fabrication that is natural to resistance welding.

Although similar production can be automatically fed, these plates are hand indexed because of the variety of sizes and shapes involved...from ten to thirty inches wide, two to ten or more feet long. Two sheets of cold rolled steel are used, one perfectly flat, the other press-embossed with interconnected vertical and horizontal channels. The two sheets are welded together with spot welds, using three-quarter inch electrodes, located at alternate ends of the flat rectangular areas between channels. Edges and ends are seam welded. Some of the larger plates have more than 2200 spots and 25 feet of seam weld. These must be high quality welds, air tight, tested to 200 pounds pressure. The plates must

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